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

Canada

TSB Recommendation A18-03

Compliance with Canadian Aviation Regulations subsection 602.11(2)

The Transportation Safety Board of Canada recommends that the Department of Transport and air operators take action to increase compliance with *Canadian Aviation Regulations* subsection 602.11(2) and reduce the likelihood of aircraft taking off with contaminated critical surfaces.

Air transportation safety investigation report	A17C0146
Date the recommendation was issued	12 December 2018
Date of the latest response	October 2022
Date of the latest assessment	March 2023
Rating of the latest response	Satisfactory Intent
File status	Active

Summary of the occurrence

On 13 December 2017, an Avions de Transport Régional (ATR) 42-320 aircraft (registration C-GWEA, serial number 240), operated by West Wind Aviation LP (West Wind) as flight 282 (WEW282), departed from Fond-du-Lac (CZFD), Saskatchewan, on an instrument flight rules flight to Stony Rapids (CYSF), Saskatchewan. On board were 3 crew members (2 pilots and 1 flight attendant) and 22 passengers. Shortly after takeoff from Runway 28 at CZFD, WEW282 collided with trees and terrain approximately 1400 feet west of the departure end of Runway 28. Nine passengers and 1 crew member received serious injuries, and the remaining 13 passengers and 2 crew members received minor injuries. One of the passengers who had received serious injuries died 12 days after the accident. The aircraft was destroyed.

At the time of issuing this recommendation, the Transportation Safety Board of Canada's (TSB) investigation into this accident (A17C0146) was ongoing, and the investigation team was completing its analysis of the information collected. However, the investigation team identified safety deficiencies in need of urgent attention. As a result, the Board made the following recommendation in advance of final report publication.

Rationale for the recommendation

The duration of cold weather and icing conditions varies widely across Canada. Many remote northern airports have an icing season of 10 months or more. Icing conditions can be both severe and persistent.

Thousands of flights take off every year from remote northern airports. Some airports serve as hubs, experience higher traffic volumes, and may have better equipment.

The absence of adequate equipment increases the likelihood that pilots will conduct a takeoff in an aircraft that has frost, ice, or snow adhering to any of its critical surfaces. Additionally, in the absence of adverse consequences, taking off with contamination on critical surfaces is a deviation that has become normalized. Therefore, providing adequate de-icing and anti-icing equipment may not be sufficient to reduce the likelihood of aircraft taking off with contaminated critical surfaces.

Some of the current defences used by the Canadian air transportation system to prevent aircraft from taking off with frost, ice, or snow adhering to any critical surface are less than adequate. Takeoffs with contaminated critical surfaces occur in substantial numbers across the spectrum of aircraft and operating categories at remote northern airports.

Non-compliance with *Canadian Aviation Regulations* subsection 602.11(2), flight crew operating manuals, company operations manuals, and company standard operating procedures can be a single point of failure of defence framework. To mitigate this, Transport Canada and air operators must take urgent action to ensure better compliance.

Organizations can audit equipment (to inspect, de-ice, and anti-ice aircraft), policies (such as ground icing operations programs and contingencies for situations where resources are not available), training (for pilots and ground staff), and operations (procedures, compliance, deviations). Air operators could incorporate questions in before-start and before-takeoff checklists with a requirement for a clean aircraft or a mitigation response from the pilot-in-command.

Accidents related to contaminated aircraft will continue to occur until the industry and the regulator approach the issue as systemic and take action to eliminate underlying factors that can negatively affect pilot compliance.

Therefore, the Board recommended that

> the Department of Transport and air operators take action to increase compliance with *Canadian Aviation Regulations* subsection 602.11(2) and reduce the likelihood of aircraft taking off with contaminated critical surfaces.
>
> **TSB Recommendation A18-03**

Previous responses and assessments

April 2019: response from Transport Canada

Transport Canada (TC) agrees with the recommendation; efforts to increase compliance with *Canadian Aviation Regulations* (CARs) subsection 602.11(2) and reduce the likelihood of aircraft taking off with contaminated critical surfaces will focus on a two-pronged targeted risk-based inspection campaign, and an education and awareness campaign.

In the winter of 2019-20, TC will conduct an inspection campaign to increase compliance with CARs subsection 602.11(2)[1] and reduce the likelihood of aircraft taking off with contaminated critical surfaces.

First, inspections will be targeted based on risk using the information gathered from the survey of northern and remote airports available de-icing and anti-icing services; the approved ground icing program (AGIP) submissions from operators; the information on icing equipment availability included in the Canada Flight Supplement; and, information on the likelihood of icing / historical reporting of icing conditions from airport authorities.

Second, TC will gather intelligence based on reporting by airport authorities, the public, and other potential sources (e.g., SECURITAS reports) to target inspections where there is reporting of non-compliance. This will aid in focusing resources where they are most likely able to identify and address potential non-compliance by air operators.

TC will conduct an evaluation of the impact of these targeted campaigns at the end of winter 2019-20. In consultation with associations including the Air Transport Association of Canada (ATAC) and the Northern Air Transport Association (NATA), TC will examine additional targeted inspection approaches and promotional measures based on the outcomes of this evaluation, and TC will update the TSB on the results and additional actions taken. Further, any outcomes of this evaluation will be considered, in part, with the recommendations of the working group referenced in A18-02.

To complement and inform this two-pronged inspection campaign, TC will also conduct an education and awareness campaign that will focus on two different communities:

1. airline operators and pilots; and,
2. the travelling public.

As an immediate measure, information was sent to all air operators and airport associations on February 1, 2019. The purpose was to remind associations and operators of recommended practices and procedures for de-icing, and provide links to the relevant TC guidance material. It also called on operators to verify that the training portion of their AGIP meets the most recent

[1] CAR subsection 602.11(2) establishes that the responsibility to ensure an ice-free surface lies with the operator and flight crew.

industry-accepted standards. TC inspectors will follow-up with operators during the summer and fall of 2019 to ensure continued compliance with the AGIP.

During the summer of 2019, TC will develop an education and awareness campaign focused on passengers in more remote communities. This will serve as a "force-multiplier" to increase public knowledge and expectations about winter operations and help inform the targeted inspection planning that was referenced above. The passenger campaign will resemble previous campaigns such as the one developed for Seaplane Safety (http://www.tc.gc.ca/publications/bil/tp14346/pdf/hr/tp14346.pdf). Specific messaging and engagement will be targeted to occasional travelers and more frequent users (e.g., public officials who visit these communities on a regular basis).

In addition, by the fall of 2019, TC will conduct a targeted communications campaign to raise awareness of the available documents and information related to airframe icing. As part of this campaign, TC will also create an "icing landing page" on its website ahead of the next winter season with links to these materials and promote it to stakeholders through regular association meetings (e.g., NATA, ATAC, and the Canadian Business Aviation Association), by correspondence and through established distribution lists (e.g., the Canadian Aviation Regulatory Advisory Council, social media).

On an ongoing basis, TC continues to engage Canadian stakeholders on a biennial basis through the Standing Committee on Operations Under Icing Conditions (SCOUIC) meeting. SCOUIC is mandated with the promotion of safe aircraft operations and airworthiness procedures under icing conditions. TC will explore the potential for applying data models to better identify and predict potential icing conditions, thereby raising the real-time awareness of air operators and airport authorities of potential icing conditions on-site. The next meeting is planned for October 2019.

August 2019: TSB assessment of the response (Satisfactory Intent)

In its response, Transport Canada (TC) indicated that it agrees with Recommendation A18-03 and will be taking the following twofold approach to address the safety deficiency identified in Recommendation A18-03:

1. a two-pronged targeted risk-based inspection campaign;
2. an education awareness campaign aimed at:

    - pilots and air operators; and
    - the travelling public.

As part of this twofold approach, TC reached out to air operators and airport authorities in February 2019, encouraging them to share links to TC's guidance material on aircraft de-icing with their members. Air operators were also asked to verify that the training portion of their approved ground icing programs (AGIP) met accepted standards and practices.

TC will also continue its engagement with stakeholders every two years through the Standing Committee on Operations under Icing Conditions (SCOUIC), with the next meeting scheduled for October 2019.

TC is also planning the following actions:

- During the summer of 2019, TC will develop an education and awareness campaign for passengers flying to and from remote communities.
- By the fall of 2019, TC will conduct a communications campaign to increase awareness of available icing-related information among aviation industry stakeholders.
- During the 2019-20 winter, TC will conduct an inspection campaign:
    - by targeting risk locations using information gathered from the survey on available de-icing and anti-icing services in northern and remote airports, and using information from sources such as the Canada Flight Supplement, reports of icing conditions from airport authorities and safety intelligence reports of non-compliance;
    - by targeting locations where non-compliance has been reported, based on intelligence reported by airport authorities, the public, and other potential sources.
- At the end of the 2019-20 winter, TC will evaluate the impact of the targeted inspection campaign and will then collaborate with industry stakeholders to assess the need for further targeted inspections and educational efforts.

The Board is encouraged that TC has initiated some actions and that it is planning additional actions in the near future. These actions, when implemented, have the potential to substantially mitigate the risk associated with the safety deficiency identified in Recommendation A18-03 by improving training and raising awareness, thereby improving compliance with CARs subsection 602.11(2) and reducing the likelihood of aircraft taking off with contaminated critical surfaces.

Therefore, the response to Recommendation A18-03 is assessed as **Satisfactory Intent**.

September 2020: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.

As a commitment by the Minister of Transport to the TSB for its Recommendation A18-03 to increase compliance to CAR 602.11(2), Phase 1 of the Targeted Inspection (TI) campaign was initiated in February 2020. The primary purpose was to observe whether operators are implementing procedures documented in their manuals and in their response to the Minister's Letter to Operators sent to them in May 2019. Unfortunately the campaign was cut short by the onset of the COVID-19 pandemic, so it was not possible to complete a representative sampling of air operators and airports during icing conditions. Therefore, insufficient data was collected to evaluate ground icing practices nationwide; however, when it is practicable to do so, TC intends to relaunch the TI campaign for the icing season of 2020/2021. An interim report of Phase I is being prepared and will be finalized in fall 2020.

TC also developed an education and awareness campaign and a status report on this campaign will be provided in the next update.

TC conducted a targeted communications campaign to raise awareness of the available documents and information related to airframe icing. As part of this campaign, TC created an "*icing landing page*[2]" on its website ahead of the next winter season with links to these materials and promoted it to stakeholders through regular association meetings (e.g., NATA, ATAC, and the Canadian Business Aviation Association), by correspondence and through established distribution lists. A status report on these initiatives will also be provided in the next update.

On an ongoing basis, TC continues to engage Canadian stakeholders on a biennial basis through the Standing Committee on Operations Under Icing Conditions (SCOUIC) meeting. SCOUIC is mandated with the promotion of safe aircraft operations and airworthiness procedures under icing conditions. TC will explore the potential for applying data models to better identify and predict potential icing conditions, thereby raising the real-time awareness of air operators and airport authorities of potential icing conditions on-site. The last meeting was held on October 30 and 31, 2019 and the next one is planned in 2021.

November 2020: update from Transport Canada

TC plans to relaunch the TI campaign with Phase 1 in Winter 2020/21 and Phase 2 in Spring 2021, followed by analysis of collected data in Summer 2021 and development of a final report with recommendations in Fall 2021. The original Phase 1, which started in February 2020, was suspended in March 2020 due to pandemic restrictions and was therefore inconclusive as a result of insufficient data collection. A project charter is being prepared to relaunch the TI campaign, which will summarize what occurred in the original Phase 1 and explain the campaign re launch. Approval of the project charter is expected in December 2020.

December 2020: TSB assessment of the response (Satisfactory Intent)

In its response, Transport Canada (TC) indicated that it agrees with Recommendation A18-03.

The TSB is encouraged that TC has reached out to stakeholders, and that educational and awareness material have been made available regarding the hazards of aircraft taking off with contaminated critical surfaces. The COVID-19 pandemic has presented challenges to TC and prevented most of its planned targeted inspections aimed at increasing compliance with *Canadian Aviation Regulations* (CARs) subsection 602.11(2). Increased compliance with the regulation would reduce the likelihood of aircraft taking off with contaminated critical surfaces.

---

[2] Transport Canada (2020), *Aircraft icing for general aviation and others*, at https://tc.canada.ca/en/aviation/publications/aviation-safety-letter/issue-3-2019/aircraft-icing-general-aviation-others (last accessed on 28 March 2023).

Until more robust actions are taken to increase compliance with CARs subsection 602.11(2), the risks associated with the safety deficiency identified in Recommendation A18-03 will continue to exist.

Therefore, the response to Recommendation A18-03 is assessed as **Satisfactory Intent**.

September 2021: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.

Since the recommendation was issued in 2018, as an immediate measure, TC sent information to all operators and airport associations to remind them of recommended practices and procedures[3] for de-icing, and provided links to the relevant TC guidance material. In 2019, TC conducted a targeted communications campaign to raise awareness of the available documents and information related to airframe icing and created an "Icing landing page"[4] on its website ahead of the winter season with links to those materials and promote it to stakeholders.

Following these immediate measures, the Department committed in September 2020 to:

- Relaunch the targeted inspection (TI) campaign (that was delayed due to the COVID-19 pandemic) with Phase 1 in Winter 2020/21 and Phase 2 in Spring 2021, followed by analysis of collected data in Summer 2021 and development of a final report with recommendations in Fall 2021; and,
- Evaluate the impact of these targeted campaigns, examine additional targeted inspection approaches and promotional measures based on the outcomes of the evaluation and develop a final report with recommendations.

Since the previous update, TC has considered whether the TI campaign should be re-started in Winter 2020/21 but recommended to postpone the campaign until Winter 2021/22 when it is anticipated that on-site observation of de-icing/anti-icing practices can resume safely. The TI campaign is on track to be re-started for Winter 2021/2022 and will consist of two phases with the second phase continuing through the summer and the final report due before the end of 2022:

- Short term - Phase I (Winter 2021/2022): Observe de-icing/anti-icing events on-site and collect information.
- Medium term - Phase II (Spring/Summer 2022): Using the observed de-icing/anti-icing events as a starting point, review operator's Ground Icing Operations Program and procedures.

---

3 Transport Canada (2020), TP 14052 – *Guidelines for Aircraft Ground – Icing Operations*, at https://tc.canada.ca/en/aviation/publications/guidelines-aircraft-ground-icing-operations-tp-14052 (last accessed on 28 March 2023).

4 Transport Canada (2019), Aviation Safety Letter (TP185E – Issue 3/2019) – *Aircraft icing for general aviation and others*, at https://tc.canada.ca/en/aviation/publications/aviation-safety-letter/issue-3-2019/aircraft-icing-general-aviation-others (last accessed on 28 March 2023).

- Long term - (Fall/Winter 2022): Collect and analyze national data, draft final report with recommendations.

The education and awareness campaign related to this issue will resume with the re-start of the TI campaign as noted above. The final report for the Ground Icing Targeted Inspection is anticipated to be ready by December 2022.

In the meantime, a follow up article in an upcoming issue of the Aviation Safety Letter is planned to complement the one that was already published and is available on the TC website[5].

As the 2021 Canadian Aviation Safety Collaboration Forum was cancelled, there was no opportunity to hold another breakout session on the topic. Another breakout is being considered for the 2022 event.

March 2022: TSB assessment of the response (Satisfactory Intent)

In its response, Transport Canada (TC) indicated that it agrees with Recommendation A18-03.

Due to the COVID-19 pandemic, TC postponed its planned relaunch for a two-phased targeted inspection (TI) campaign, which also delayed the resumption of its education and awareness campaign related to de-icing. According to updated information received from TC in January 2022, Phase I of the TI campaign is scheduled to be completed by 31 March 2022. The target completion date for Phase II is June 2022, and TC Regional Analysis, Occurrence, Planning and Reporting branches will conduct quality control and tracking of completed inspections. TC will evaluate the impact of this TI campaign, examine additional TI approaches and promotional measures based on the outcomes of the evaluation and develop a final report with recommendations. The final report for the Ground Icing Targeted Inspection is anticipated to be made available by December 2022.

The Board is pleased with the relaunch of TC's TI campaign this winter, including the resumption of other related initiatives in 2022. The COVID-19 pandemic has presented challenges to TC, which delayed many of its planned actions aimed at increasing compliance with *Canadian Aviation Regulations* (CARs) subsection 602.11(2).

These actions, when implemented, have the potential to substantially reduce the risk associated with the safety deficiency identified in Recommendation A18-03 by raising awareness and increasing compliance with the regulation and thus reducing the likelihood of aircraft taking off with contaminated critical surfaces. However, until these actions are completed, the risks associated with the safety deficiency identified in Recommendation A18-03 remain.

Therefore, the response to Recommendation A18-03 is assessed as **Satisfactory Intent.**

---

5 Ibid.

Latest response and assessment

October 2022: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.[6]

Since the recommendation was issued in 2018, as an immediate measure, TC sent information to all operators and airport associations to remind them of recommended practices and procedures[7] for de-icing, and provided links to the relevant TC guidance material. In 2019, TC conducted a targeted communications campaign to raise awareness of the available documents and information related to airframe icing and created an "Icing landing page"[8] on its website ahead of the winter season with links to those materials and promote it to stakeholders.

Following these immediate measures, the Department committed in September 2021 to:

- Relaunch the targeted inspection (TI) campaign (that was delayed due to the COVID-19 pandemic) with Phase 1 in Winter 2021/22 and Phase 2 in Spring/Summer 2022, followed by analysis of collected data and development of a final report with recommendations in Fall/Winter 2022.
- Evaluate the impact of these targeted campaigns, examine additional targeted inspection approaches and promotional measures based on the outcomes of the evaluation and develop a final report with recommendations.

Since the previous update, TC completed Phase 1 of the TI campaign over Winter 2021-22. Analysis of Phase 1 of the TI campaign was successful in identifying gaps in compliance. Results have led TC to re-examine the planned next steps. While the previously planned Phase 2 of the TI will move forward, additional activities are also being recommended. Recommendations on how to proceed are now being consulted and will be presented to TC senior management in Fall 2022. If approved, TCCA will:

- Short term (Fall 2022): Proceed with Phase 2 of the TI as planned to understand flight crew decision-making process and identify best practices.
- Medium term (Winter 2022/2023): Conduct *ad-hoc* ground icing inspections on an opportunity basis. Analyze results of completed Phase 2 inspections and produce report with recommendations.

---

6 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.

7 Transport Canada (2020), TP 14052 – *Guidelines for Aircraft Ground – Icing Operations*, at https://tc.canada.ca/en/aviation/publications/guidelines-aircraft-ground-icing-operations-tp-14052 (last accessed on 28 March 2023).

8 Transport Canada (2019), Aviation Safety Letter (TP185E – Issue 3/2019) – *Aircraft icing for general aviation and others*, at https://tc.canada.ca/en/aviation/publications/aviation-safety-letter/issue-3-2019/aircraft-icing-general-aviation-others (last accessed on 28 March 2023).

- Long term (Spring 2023 and ongoing): Based on results of final report: project plan recommendations, develop new safety promotion material / campaign to raise awareness in the industry, and engage with industry associations to promote safe practices. Explore a possibility to develop a pilot project using remote surveillance technology to monitor activities at remote aerodromes.

A final report on the Ground Icing Targeted Inspection was originally planned for Winter 2022. A report following Phase 2 of the TI will still be developed but the campaign's final report may be delayed to include results from the additional inspections being recommended over the upcoming winter. Confirmation to come following approval of Phase 1 report recommendations.

As an ongoing commitment, TC will conduct a targeted communications campaign to raise awareness of the available documents and information related to airframe icing by circulating another de-icing email to industry. This is planned for January 2023 and will contain information on available documents related to the topic. Plans for an icing landing page are underway.

TC will continue engaging with Canadian stakeholders by holding the next Standing Committee on Operations Under Icing Conditions (SCOUIC) meeting on October 4-5, 2022. TC also continues to participate at the Canadian Aviation Safety Collaboration Forum (CASCF) via work with the De-icing and Anti-icing at Remote Locations Working Group.

March 2023: TSB assessment of the response (Satisfactory Intent)

In its response, Transport Canada (TC) indicated that it agrees with Recommendation A18-03.

Since the last TSB assessment, TC completed Phase 1 of the targeted inspection (TI) campaign. The Board understands that Phase 1 of the TI campaign identified gaps in compliance and that the results have led TC to re-examine the planned next steps. Phase 2 of the TI campaign will now move forward; additional activities are also being recommended.

The final report for the Ground Icing Targeted Inspection, originally planned for release in Winter 2022, is now anticipated to be made available after Phase 2 of the TI campaign is completed. Subsequent to its October 2022 response, TC informed the TSB that all targeted inspections should be completed by 31 March 2023. Once the analysis of the results is completed, TC will share a final report with the TSB.

Additionally, although TC had planned to conduct a targeted communications campaign in January 2023 to raise industry awareness of the available documents related to the topic of de-icing, this has not occurred to date. However, cold weather operations and de-icing was featured in TC's December 2022 Aviation Safety Letter (Issue 4/2022).

While some action has been taken by TC to assess and gather information, the Board is concerned with the protracted delays of its planned actions aimed at increasing compliance with *Canadian Aviation Regulations* (CARs) subsection 602.11(2).

The proposed actions, when implemented, have the potential to substantially reduce the risk associated with the safety deficiency identified in Recommendation A18-03 by raising awareness and increasing compliance with the regulation and, thus, reducing the likelihood of aircraft taking off with contaminated critical surfaces. However, until these actions are completed, the risks associated with the safety deficiency identified in Recommendation A18-03 remain.

Therefore, the Board considers the response to Recommendation A18-03 to show **Satisfactory Intent**.

File status

The TSB will continue to monitor TC's action to increase compliance with CARs subsection 602.11(2), with the goal of reducing the likelihood of aircraft taking off with contaminated critical surfaces. The TSB will reassess the deficiency on an annual basis or when otherwise warranted.

This deficiency file is **Active**.