



TSB Recommendation A18-02

De-icing and anti-icing equipment

The Transportation Safety Board of Canada recommends that the Department of Transport collaborate with air operators and airport authorities to identify locations where there is inadequate de-icing and anti-icing equipment and take urgent action to ensure that the proper equipment is available to 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	September 2025
Date of the latest assessment	March 2026
Rating of the latest response	Unsatisfactory
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 risks of adverse consequences likely vary from airport to airport. Identifying high-risk locations for immediate mitigation has the potential to quickly reduce the likelihood of aircraft taking off with frost, ice, or snow adhering to any critical surface at those locations.

Transport Canada, air operators, and airport authorities have the capacity to identify high-risk locations, analyze them for hazards and risks, and take mitigating action.

Therefore, the Board recommended that

the Department of Transport collaborate with air operators and airport authorities to identify locations where there is inadequate de-icing and anti-icing equipment and take urgent action to ensure that the proper equipment is available to reduce the likelihood of aircraft taking off with contaminated critical surfaces.

TSB Recommendation A18-02

Previous responses and assessments

April 2019: response from Transport Canada

Transport Canada (TC) agrees with the recommendation and is collaborating with air operators and airport authorities to take urgent action to address this safety risk.

TC recognizes the need for additional actions to address the safety risks posed by icing. Immediately in response to this recommendation, TC gathered information to create an accurate account of the de-icing and anti-icing resources that are currently available.

On January 22, 2019, TC requested that its regional offices reach out to air operators and airport authorities in order to consolidate information on the de-icing and anti-icing services available at the airports. Specific emphasis was placed on remote and northern airports, and how operators conduct their operations at these locations.

Overall, the information gathered indicates that very few northern or remote airports in any of the regions have de-icing and anti-icing equipment available. Those that do often have very limited capabilities. Air operators will often carry their own de-icing equipment, or have access to portable equipment at certain locations, but capacity is limited. Given that access to aircraft surfaces (e.g., wings and tail) and appropriate space to perform de-icing is often lacking at

northern and remote airports, use of this equipment also presents challenges related to crew safety.

The results of the survey are concerning. The importance of this safety issue requires greater awareness and action by operators and airports. To achieve this, the Minister of Transport will issue a letter to all operators reiterating that it is the responsibility of the air operator and their pilots to comply with all requirements outlined in the *Canadian Aviation Regulations* (CARs) subsection 602.11(2), as well as *Commercial Air Services Standards* (CASS) 622.11. The letter will also ask operators to work with the airports they serve to increase the provision of adequate de-icing and anti-icing equipment. Finally, it will request that air operators submit their approved ground icing program (AGIP) plans no later than June 30, 2019. The submissions will be reviewed against industry-accepted standards and assist in identifying current deficiencies.

TC will also send a letter to airport authorities asking that they actively engage and collaborate with air operators on solutions to address the safety issue as it has a direct link to northern and remote airport operational realities.

In addition, TC will also meet with air operators and airport authorities at the April 2019 Northern Air Transport Association (NATA) Annual General Meeting (AGM) in Yellowknife, NT. The work done at this event will aim to identify initiatives in the short and medium-term to address this urgent safety risk. The outcomes of this collaboration will help direct immediate additional initiatives that will be taken by stakeholders in advance of the 2019-20 winter season.

Airports possessing de-icing and anti-icing equipment for operator use publish this capacity in the Canada Flight Supplement (CFS). This information is available to all aircraft operators. If an airport does not have de-icing and/or anti-icing services published in the CFS, air operators are to assume that the equipment or services are not available at that location. However, TC recognizes that many operators choose to avoid flying when icing is present instead of carrying or using their on-board or portable de-icing equipment. While TC recognizes that this is one strategy in mitigating the risks associated with icing conditions, it also presents challenges in emergency situations and in ensuring reliable access to northern and remote communities.

Therefore, in the short-term, TC is working with air operators and airport authorities to increase the awareness and understanding of the regulatory requirements. Using the information from the survey of northern and remote airports, air operator AGIP submissions, existing information available in the CFS, and looking to potential methods for predicting icing conditions will help inform risk-based actions that target areas where icing is most likely to occur.

TC believes that the targeted education of pilots, air operators (including all those involved with air operations, such as dispatchers, etc.) and airport operators is the most effective short-term method to increase compliance with the CARs and encourage the provision of adequate de-icing

and anti-icing equipment. Planned actions related to education of pilots and operators are described below in the response to Recommendation A18-03.

In the medium term, in fiscal year 2019-20, the department will initiate an in-depth regulatory examination of the issue. TC will establish a working group (made up of key stakeholders including: air operators, airport authorities, communities, and pilot associations) to conduct a risk assessment and examine measures, including additional education and awareness campaigns, policy, standards and/or regulations to further reduce the likelihood of aircraft taking off with contaminated surfaces. This work will aim to bring a full scope of impacted stakeholders together, including the TSB, to ensure all views and possible approaches are considered to address this important aviation safety risk. The complete report and recommendations advanced by the working group will be finalized by fall 2020. This report will be provided to the TSB once finalized.

In recognition of the urgent action that is required to address the safety risks posed by icing, the actions outlined above have begun or will begin before the beginning of the 2019-20 winter season. The intent of these actions will be to further build on the Canadian regulatory requirements in place to reduce the likelihood of aircraft taking off with contaminated crucial surfaces. CAR subsection 602.11(2) establishes that the responsibility to ensure an ice-free surface is with the operator and flight crew. These regulations are similar to the operational requirements that are found within the *Federal Aviation Regulations (FAR) 121.629* in the United States, the European Air Regulations (*Air OPS regulation (EU) 965/2012*), *CAT.OP.MPA.250* as mandated by EASA and other National Aviation Authorities.

May 2019: update to response from Transport Canada

At the April 2019 Northern Air Transport Association (NATA) Annual General Meeting, Transport Canada officials used their regulatory presentation session to highlight the TSB recommendations, plans for addressing them and called on attendees to provide comments and suggestions on how to improve conditions at Northern and Remote Airports. While the session did not produce a great deal of feedback from those in attendance, TC officials had additional conversations following the session with attendees including airport, air operator and ground support organizations to discuss possible options and considerations regarding improved anti-icing /de-icing operations. As a follow-up, TC is set to discuss options and considerations at the upcoming NATA Board of Directors meeting in June 2019. Part of this discussion will be to formalize how additional input could be generated from aviation stakeholders operating in northern and remote communities.

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

In its response, Transport Canada (TC) indicated that it agrees with Recommendation A18-02.

To address the safety deficiency identified in Recommendation A18-02, regarding the identification of locations where there is inadequate de-icing and anti-icing equipment and the requirement for urgent action to ensure that the proper equipment is available to reduce the

likelihood of aircraft taking off with contaminated critical surfaces, TC has taken the following short-term actions:

- In early 2019, TC commenced collaborative action with air operators, airport authorities, as well as the Northern Air Transport Association (NATA) and its members, to mitigate the risks identified in Recommendation A18-02.
- In January 2019, TC requested that its regional offices reach out to air operators and airport authorities in order to consolidate information on the de-icing and anti-icing services available at airports, with specific emphasis placed on remote and northern airports. This initiative confirmed that de-icing and anti-icing capability is only available at very few remote and northern airports.
- In April 2019, TC highlighted TSB's recommendations A18-02 and A18-03 and the plans for addressing these two recommendations during its regulatory presentation at the NATA Annual General Meeting.
- In May 2019, TC sent a letter to all air operators reiterating the requirement to comply with *Canadian Aviation Regulations* (CARs) subsection 602.11(2), as well as *Commercial Air Services Standards* (CASS) 622.11. Additionally, the letter called on all air operators to work with their flight crews and airport authorities to better address the risks highlighted by recommendations A18-02 and A18-03. Air operators were also asked to confirm by June 30, 2019, what actions they will be taking ahead of winter 2019-2020 to reduce the likelihood of aircraft taking off with contaminated critical surfaces and ensure that the proper equipment is available to comply with CARs subsection 602.11 (2). To date, responses were received from most operators.
- In June 2019, TC's Director General Civil Aviation attended the NATA Board of Directors meeting, where icing was discussed.
- In July 2019, TC sent a letter to airport authorities asking them to actively engage and collaborate with air operators to find solutions to address the safety deficiency identified in Recommendation A18-02.

As a mid-term action, TC is also planning to establish, in fiscal year 2019-20, a working group comprised of various stakeholders to examine the safety risks and identify measures, including additional education and awareness campaigns, policy, standards and/or regulation, to further reduce the likelihood of aircraft taking off with contaminated critical surfaces. TC indicated that the results of this effort will be available by fall 2020.

The Board is encouraged that TC has completed some actions and that it is planning additional actions in the near future, including the creation of a stakeholder working group. These actions, when implemented, have the potential to substantially mitigate the risk associated with the safety deficiency identified in Recommendation A18-02, by identifying locations where there is inadequate de-icing and anti-icing equipment, and by increasing the provision of such equipment to reduce the likelihood of aircraft taking off with contaminated critical surfaces.

Therefore, the response to Recommendation A18-02 is assessed as **Satisfactory Intent**.

September 2020: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.

In response to TC's May 2019 letters to 803 air operators holding *Canadian Aviation Regulations* (CARs) 604, 703, 704 and 705 certificates and to airport operators holding CARs 302 certificates, 39% replied:

- Most of the responding air operators reported they do not allow aircraft to take off if ice, snow or frost is adhering to any of the aircraft's critical surfaces. The operators confirmed compliance with CAR 602.11(2) and described measures they undertake to fulfill this requirement.
- Only 12 airport operators replied; the responses varied from having 24/7 availability of de-icing/anti-icing equipment/materials to closing runways during freezing season.

In late 2019, the department established a De-icing in Remote Locations Working Group, comprised of 10 industry partners, including both airport and air operators, along with TC personnel from across the country. The working group objectives are to examine the safety risks and recommend solutions to improve the consistent use and availability of de-icing and anti-icing equipment. This includes additional education and awareness campaigns, a review of equipment use and availability and a review of TC's policy, standards and regulations in an effort to further reduce the likelihood of aircraft taking off with contaminated critical surfaces.

In January, TC facilitated a breakout session on de-icing at the Canadian Aviation Safety Collaboration Forum (CASCF) on January 15, 2020. Stakeholders were encouraged to participate in this working group. The goal of the breakout session was to:

1. Raise awareness to the concerns and recommendations brought forward by the TSB in A18-02 and A18-03 and the letter from [TSB Chair] Kathleen Fox to the Minister of Transport dated December 14, 2018, emphasizing the apparent normalizing of many pilots taking off with contamination on critical surfaces.
2. Motivate and inspire leaders in the aviation industry appealing to our moral compasses and professional ethics to work together in reducing this risk by using our combined experience and influence.
3. Get commitment from enough leaders to have a cross section of the industry who are motivated to move forward on this initiative.

There were some excellent discussions during the breakout session, and a lot of commitment from industry seeking to participate in this working group. TC will now begin following-up with these individuals to discuss formalizing this initiative, with the first priority being to develop/approve a Terms of Reference, which will outline the group's mutually agreed upon goals and responsibilities. Its review and approval was on the agenda for the first meeting which was scheduled to take place in March 2020; however, in light of COVID-19 this has been delayed to allow industry time to deal with the many challenges they are facing during the pandemic.

TC remains committed in engaging our industry stakeholders and has reached out to the working group members in August 2020 to re-engage in discussions and reschedule this initial meeting for late September, prior to the 2020 winter season.

November 2020: update from Transport Canada

On October 1, 2020, the first De-icing in Northern and Remote Communities working group (DNRC) meeting was held via MS Teams, producing the first results on the examination of this issue. The working group consists of 32 participants from a diverse group of external industry stakeholders spanning across the country, including various air operators, airports, associations such as National Air Transportation Association (NATA), Air Transport Association of Canada (ATAC), Airline Pilots Association (ALPA) and Réseau Québécois des Aéroports. As well, internal TC participation included Subject Matter Experts (SME's) from various regions, TC Headquarters Aviation Safety Regulatory Affairs, Aviation Policy and Programs Branch (Airport Capital Assistance Program, ACAP).

The agenda included three main topics, the first being a review of the draft Terms of Reference, including a discussion to determine the frequency of meetings. Secondly, TC provided an overview of the existing TC/industry Standing Committee Under Icing Conditions (SCUIC). This provided an opportunity for the DNRC working group members to understand the parallels and differences between the two groups in an effort to avoid duplication and ensure outcomes and recommendations are complimentary. Lastly, the working group members were divided into four sub-groups, each chaired by an industry member to discuss a set of questions which were provided to participants two weeks prior to the meeting. The objective was to gather input and different perspectives focusing on several questions, as an example, *“the magnitude or level of risk is for pilots taking off with surface contamination at Northern or remote airports?; what are the high-risk locations?; examining the existing infrastructure and reviewing present use of available facilities; and where are the operational or occupational safety hazards?”* To provide sufficient time to thoroughly answer all the questions, the sub-group meetings continued throughout the months of October and November. The results of these discussions have been documented and by early December 2020 they will be summarized into themes and used as a tool to guide future working group discussions and recommendations.

The next DNRC meeting is scheduled for the week of December 7, 2020. TC has compiled a list of all airports in Canada that are located in northern/remote communities (this criteria is based on airports located north of the 51st parallel). The objectives of the next meeting will be to discuss an approach on what information needs to be obtained for existing de-icing/anti-icing equipment and storage facilities currently available at each site and divide up the collection of information by sub-group.

Subsequent meetings will focus on the results of information collected regarding existing de-icing/anti-icing equipment and facilities and make recommendations on future safety improvements (i.e., equipment, funding, storage facilities, and upgrades to infrastructure, regulatory /policy changes).

The overall objective of the working group is to produce a report by March 30, 2021. The report will focus on the results of the working group discussions, including a national list of de-icing/anti-icing equipment and facilities available at each of the northern & remote airports. As well, observations and recommendations on future improvements that could lead to improved safety.

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

In its response, Transport Canada (TC) indicated that it agrees with Recommendation A18-02.

The TSB is encouraged that TC has reached out to stakeholders, that working groups have been created, and that discussions are occurring to address the safety issues identified in this recommendation. The COVID-19 pandemic has presented many challenges to the industry, which have delayed the development of concrete actions to ensure proper de-icing and anti-icing equipment is available to reduce the likelihood of aircraft taking off with contaminated critical surfaces.

Until steps are taken to ensure proper de-icing and anti-icing equipment is available, the risks associated with the safety deficiency identified in Recommendation A18-02 will continue to exist.

Therefore, the response to Recommendation A18-02 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 immediate measures, TC mobilized airport authorities to engage and collaborate with air operators on solutions to address the safety issues. The Minister of Transport also reiterated that it is the responsibility of the air operator and their pilots to comply with all the requirements outlined in the *Canadian Aviation Regulations* (CARs) (602.1(2)) as well as *Commercial Air Service Standards* (CASS) 322.11. TC met with air operators and airport authorities at the April 2019 Northern Air Transport Association (NATA) AGM in Yellowknife (NT) and three other times with NATA in June and September 2019 and in January 2020 to identify initiatives in the short and medium-term to address this safety risk.

Following these measures and meetings with air operators and airport authorities, the Department committed in September 2020 to:

- Establish a De-Ice in Northern and Remote Communities (DNRC) working group to conduct a risk assessment, examine challenges and barriers associated with de-icing in remote locations and identify options and mitigation measures, including additional education and awareness campaigns, infrastructure, equipment and policy, to further reduce the likelihood of aircraft taking off with contaminated critical surfaces.

Since the previous update, a De-icing/Anti-icing Working Group was formed and first met virtually in October 2020, having been delayed due to the COVID-19 pandemic. The group discussed a number of questions put forward by different members associated with issues, challenges, and barriers arising from TSB Recommendations A18-02 and A18-03 in subsequent meetings.

In February 2021, following the review of the meetings summaries, more questions arose and the group concluded it was too early to start making recommendations and decided to move into identifying locations of concern as recommended in A18-02.

To this end, in March 2021, TC conducted a “Northern Blitz” inspection of 18 airports in the three territories, this also included interviewing air operators, pilots, CARs operators, airport personnel, and government transportation personnel on de-icing and anti-icing practices and noting relevant equipment and infrastructure at these airports. From the interviews and observations, there were no indications of high risk or breach of regulations in regard to aircraft taking off with surface contamination and it did not support TC taking any “urgent action”. This may be the positive results of actions already taken by TC and the aviation industry and the overall increased level of awareness.

The working group met in April 2021 and felt that “identifying locations where there is inadequate de-icing equipment” could be perceived as scrutinizing individual carriers as it can be very difficult to determine what is adequate or inadequate at any given airport as there are many variables such as size of airport and available space, airport operator/owner, number of operators using the airport, types of aircraft, etc.

In May 2021, the working group decided to “dig deeper” into the issues and drafted three sets of survey questions specifically for the operators, the pilots, and the airport operators. In June 2021, the first draft surveys were completed and were reviewed in August 2021 before going to the main working group for feedback. The surveys will then be dispersed accordingly with the help of industry associations.

It is the hope of the working group that careful analysis of the survey responses will provide needed guidance to identify locations where there is inadequate de-icing equipment and in making other recommendations to the Minister.

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

In its response, Transport Canada (TC) indicated that it agrees with Recommendation A18-02.

The Board is encouraged that TC has taken additional steps and has conducted inspections of 18 northern airports, including interviews and assessments of de-icing and anti-icing equipment availability at these locations. The Board notes that these inspections did not find indications of high risk or breach of regulations related to aircraft taking off with surface contamination. TC’s planned survey of stakeholders will help identify locations where there is inadequate de-icing equipment and in making other recommendations to the Minister of Transport.

While some action has been taken by TC to assess and gather information, until measures are taken to ensure proper de-icing and anti-icing equipment is available at remote and northern airports, the risks associated with the safety deficiency identified in Recommendation A18-02 remain.

Therefore, the response to Recommendation A18-02 is assessed as **Satisfactory Intent**.

October 2022: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.¹

Since the recommendation was issued in 2018, as immediate measures, TC mobilized airport authorities to engage and collaborate with air operators on solutions to address the safety issues. The Minister of Transport also reiterated that it is the responsibility of the air operator and their pilots to comply with all the requirements outlined in the *Canadian Aviation Regulations* (CARs) (602.1(2)) as well as *Commercial Air Service Standards* (CASS) 322.11. TC met with air operators and airport authorities at the April 2019 NATA AGM in Yellowknife (NT) and three other times with the Northern Air Transportation Association (NATA) in June and September 2019 and in January 2020 to identify initiatives in the short and medium-term to address this safety risk.

In 2020, a De-Ice in Northern and Remote Communities (DNRC) working group was formed to conduct a risk assessment, examine challenges and barriers associated with de-icing in remote locations and identify options and mitigation measures, including additional education and awareness campaigns, infrastructure, equipment and policy, to further reduce the likelihood of aircraft taking off with contaminated critical surfaces.

Following these measures, meetings with air operators and airport authorities and the creation of the DNRC, the Department committed in September 2021 to:

- With the DNRC, continue to examine challenges and barriers associated with de-icing in remote locations and identify options and mitigation measures, including additional education and awareness campaigns, infrastructure, equipment and policy, to further reduce the likelihood of aircraft taking off with contaminated critical surfaces.

As mentioned in the last update, in May 2021, the working group co-chairs decided to “dig deeper” into the issues and drafted three sets of survey questions specifically for the operator, the pilots, and the airport operator. The recommendation of “identifying locations where there is inadequate de-icing and anti-icing equipment” raised discussion on the criterion for an airport having inadequate equipment which led them to a decision to develop new surveys that

¹ All responses are those of the stakeholders to the TSB in written communications and are reproduced in full. The TSB corrects typographical errors and accessibility issues 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.

included airport operators, CARs 700 operators and individual pilots. TC is planning to send the survey to the pilots and air and airport operators by the end of 2022.

In June of 2021 the first draft surveys were completed, and TC is aiming to send them to pilots and air and airport operators by the end of 2022. The analysis of the results is expected to be completed by March 2023. The outcome of this final survey may result in additional recommendations from the working group.

Also, in 2021-22, TC conducted several northern “blitz” campaigns of airports located in the Yukon, Northwest Territories, Nunavut, Saskatchewan and Manitoba. This included observations of company equipment and supplies on site (airports not having a service provider), interviews with airport operators, pilots, air operator management, and air radio and CARs operators there was no indication of high or medium risk as operators were being responsible in ensuring the risk is managed and mitigated. This information was shared with the working group which aided in their discussions.

At the end of these discussions, several preliminary recommendations emerged in the areas of ground icing programs, surveillance, oversight, awareness campaigns, training, equipment availability and safety culture. Next steps will be for the DNRC to review and implement those recommendations. Although it is difficult to project an exact completion date for the working group’s recommendations, the aim is for early 2023.

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

In its response, Transport Canada (TC) indicated that it agrees with Recommendation A18-02.

The De-Ice in Northern and Remote Communities (DNRC) working group was established in 2020 with the purpose of conducting a risk assessment, examining challenges and barriers associated with de-icing in remote locations, and identifying mitigation measures, such as additional education and awareness campaigns, infrastructure, equipment and policy, to further reduce the likelihood of aircraft taking off with contaminated critical surfaces.

In 2021-22, a number of northern “blitz” campaigns were carried out by TC at airports located in the Yukon, Northwest Territories, Nunavut, Saskatchewan, and Manitoba. The results of the campaigns were shared with the DNRC working group, which then developed preliminary recommendations surrounding ground icing programs, surveillance, oversight, awareness campaigns, training, equipment availability, and safety culture. The next steps are for the DNRC to review and implement those recommendations, and this is anticipated for early 2023.

Since the last TSB assessment, TC has further developed draft surveys and was planning to issue them to air operators, airport operators and pilots by the end of 2022, and then analyze the data gathered from them by early 2023. The intent of the survey was to help TC identify locations where there is inadequate de-icing equipment and make other recommendations to the Minister of Transport. However, TC has recently confirmed that due to mitigating circumstances, the distribution of the surveys is on hold, and the working group is considering other viable options.

While some action has been taken by TC to assess and gather information, the Board is concerned with the protracted delays in implementing urgent concrete measures to ensure proper de-icing and anti-icing equipment is available at remote and northern airports. As such, the risks associated with the safety deficiency identified in Recommendation A18-02 remain.

Therefore, the Board considers the response to the recommendation to show **Satisfactory Intent**.

September 2023: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.

Since the recommendation was issued in 2018, as immediate measures, TC mobilized airport authorities to engage and collaborate with air operators on solutions to address the safety issues. The Minister of Transport also reiterated that it is the responsibility of the air operator and their pilots to comply with all the requirements outlined in the *Canadian Aviation Regulations* (CARs) (602.1(2)) as well as *Commercial Air Service Standards* (CASS) 322.11. TC met with air operators and airport authorities at the April 2019 NATA AGM in Yellowknife (NT) and three other times with Northern Air Transportation Association (NATA) in June and September 2019 and in January 2020 to identify initiatives in the short and medium-term to address this safety risk.

In 2020, a De-Ice in Northern and Remote Communities (DNRC) working group was formed to conduct a risk assessment, examine challenges and barriers associated with de-icing in remote locations and identify options and mitigation measures, including additional education and awareness campaigns, infrastructure, equipment, and policy, to further reduce the likelihood of aircraft taking off with contaminated critical surfaces.

Also, in 2021–22, TC conducted several northern “blitz” campaigns of airports located in the Yukon, Northwest Territories, Nunavut, Saskatchewan, and Manitoba. These included observations of company equipment and supplies on site (airports not having a service provider), interviews with airport operators, pilots, air operator management, and air radio and CARs operators. There was no indication of high or medium risk as operators were being responsible in ensuring the risk is managed and mitigated. This information was shared with the working group which aided in their discussions.

Following these measures, meetings with air operators and airport authorities and the creation of the DNRC, the Department committed in October 2022 to:

- With the DNRC, continue to examine challenges and barriers associated with de-icing in remote locations and identify options and mitigation measures, including additional education and awareness campaigns, infrastructure, equipment, and policy, to further reduce the likelihood of aircraft taking off with contaminated critical surfaces.

As mentioned in TC's previous update, the DNRC co-chairs decided to "dig deeper" into the issues and drafted survey questions specifically for the operator, the pilots, and the airport operator:

- **Air Operator Survey:** The Air Line Pilots Association (ALPA) raised concerns about its members participating in surveys, including the TSB survey of pilots in 2018. To ensure their involvement, an agreement was proposed where ALPA would conduct and own the survey, protecting its members while allowing the working group to utilize screened results. Unfortunately, this approach encountered legal complications related to data protection and disclosure, leading to the surveys not being conducted.
- **Airport Operator Survey:** Group 1 and most Group 2 airports in Canada have service providers for aircraft de-icing and anti-icing. Since there are no regulatory requirements for airport operators to provide these services, the working group focused on air operators' responsibilities to ensure sufficient infrastructure and trained personnel, particularly for larger aircraft like the ATR and Dash 8. All airport operators interviewed confirmed the availability of space and power for air operators to store de-icing and anti-icing equipment and fluids.

Although there has been no formal closure of the working group, members of the working group represented all three groups of the intended surveys, and it was generally felt there may not have been much more gained. The working group did however make recommendations that would directly or indirectly address both TSB recommendations A18-02 and A18-03 in the areas of ground icing programs, surveillance, oversight, awareness campaigns, training, equipment availability and safety culture.

These recommendations will be presented to TC Civil Aviation on October 25, 2023, for consideration.

TC continues in its engagement with stakeholders every two years through the Standing Committee on Operations Under Icing Conditions (SCOUIC), targeting risk locations in its surveillance program, developing education and awareness campaigns, and reviewing ground icing programs during inspections.

There is no "one size fits all" solution; the onus is on the operator to ensure the risk of pilots taking off with contaminated surfaces is mitigated. Unfortunately, there will be cancelling, delaying or diversion of flights when ground icing conditions exist, as there are when maintenance issues arise and there is lack of infrastructure at destination airports.

In the final analysis, we must trust disciplined decision making by flight crews regarding de-icing and anti-icing, no different than adhering to loading restrictions or carrying of minimum required fuel. Flight crews must be supported by the operator and compliance to regulation ensured by TC. Since the accident in Fond-du-Lac in 2017, efforts made by all concerned to reduce the risk of pilots taking off with contaminated surfaces have shown to be effective.

February 2024: TSB assessment of the response (Unable to Assess)

In its response, Transport Canada (TC) indicated that it agrees with Recommendation A18-02.

Since the last TSB assessment, the De-Ice in Northern and Remote Communities (DNRC) Working Group has gathered information from a survey of airport operators; however, according to TC, a survey of pilots and air operators did not proceed as planned due to legal complications. While all the airport operators surveyed stated that space and power were available for air operators to store and use de-icing and anti-icing equipment and fluid, TC's response does not indicate if it has identified specific northern and remote locations that have inadequate de-icing and anti-icing equipment.

In its September 2023 response, TC stated that the DNRC Working Group would be presenting recommendations that would address the safety deficiencies identified in both recommendations A18-02 and A18-03, including equipment availability. In follow-up correspondence with TC, it confirmed that the recommendations from the DNRC Working Group were presented on 25 October 2023; however, those recommendations have not yet been shared with the TSB, pending approval.

The TSB disagrees with TC's statement regarding the onus being on only "the operator[s] to ensure the risk of pilots taking off with contaminated surfaces is mitigated."

The intent of the recommendation is to have TC collaborate with air and airport operators to identify locations where there is inadequate de-icing and anti-icing equipment and then to take action to ensure that proper equipment is made available to reduce the likelihood of aircraft taking off with contaminated critical surfaces. Without ensuring that operators are providing this equipment, flight crews are susceptible to repeating the actions that occurred leading up to the accident in Fond-du-Lac, Saskatchewan, and the risks associated with the safety deficiency identified over 5 years ago in Recommendation A18-02 remain.

Until the TSB is informed of the recommendations of the DNRC Working Group and TC's action plan in response to those recommendations, it remains unclear whether the actions planned will mitigate the safety deficiency identified in Recommendation A18-02.

Therefore, the Board is **Unable to Assess** the response to Recommendation A18-02.

September 2024: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.

Since the recommendation was issued in 2018, as immediate measures, TC mobilized airport authorities to engage and collaborate with air operators on solutions to address the safety issues. The Minister of Transport also reiterated that it is the responsibility of the air operator and their pilots to comply with all the requirements outlined in the *Canadian Aviation Regulations* (CARs) (602.1(2)) as well as Commercial Air Service Standards (CASS) 322.11. TC met with air operators and airport authorities at the April 2019 NATA AGM in Yellowknife (NT)

and three other times with the National Air Transportation Association (NATA) in June and September 2019 and in January 2020, to identify initiatives in the short and medium-term to address this safety risk.

In 2020, a De-Ice in Northern and Remote Communities (DNRC) working group was formed to conduct a risk assessment, examine challenges and barriers associated with de-icing in remote locations and identify options and mitigation measures, including additional education and awareness campaigns, infrastructure, equipment and policy, to further reduce the likelihood of aircraft taking off with contaminated critical surfaces.

In 2021-22, the DNRC working group initiated a comprehensive effort to “dig deeper” into the de-icing challenges in northern and remote communities. The group drafted surveys for air operators, pilots, and airport operators. However, legal complications with the Air Line Pilots Association (ALPA) led to the cancellation of these surveys. The group also focused on ensuring that air operators had adequate infrastructure and trained personnel for de-icing, particularly for larger aircraft like the ATR and Dash 8.

Also, in 2021-22, TC conducted several northern “blitz” campaigns of airports located in the Yukon, Northwest Territories, Nunavut, Saskatchewan, and Manitoba. This included observations of company equipment and supplies on site (airports not having a service provider), interviews with airport operators, pilots, air operator management, and air radio and CARs operators, there was no indication of high or medium risk as operators were being responsible in ensuring the risk was managed and mitigated. This information was shared with the working group which aided in their discussions.

In October 2022, TC committed to continuing its work with the DNRC to examine challenges and barriers associated with de-icing in remote locations. This included identifying options and mitigation measures, such as additional education and awareness campaigns, infrastructure improvements, equipment availability, and policy enhancements.

Despite these efforts, since our previous update in September 2023 (RDIMS 19764552), the working group concluded that a register of de-icing equipment, recommended by the Transportation Safety Board (TSB), was ineffective as a risk mitigation measure. This was due to the dynamic nature of the industry, where de-icing equipment is typically provided by third-party contractors based on demand rather than being permanent fixtures.

Although the equipment register proved ineffective, the working group made several other recommendations to address the risks associated with de-icing in remote locations. These recommendations, which focus on ground icing programs, surveillance, oversight, awareness campaigns, training, and safety culture, have been incorporated into the response to TSB Recommendation A18-03.

TC continues to engage with industry stakeholders through various channels, such as the Canadian Aviation Safety Collaboration Forum (CASCF), the Air Taxi Safety Campaign, and the Aviation Safety Letter (ASL). At the April 2024 CASCF, critical surface contamination was a

major topic of discussion, and further engagement is planned for the Standing Committee on Operations Under Icing Conditions (SCOUIC) meetings in October 2024. These forums are crucial for sharing information on aircraft de-/anti-icing and addressing operational challenges.

Additionally, TC is integrating this recommendation into the Air Taxi Safety Campaign, with upcoming working groups focusing on key areas related to surface contamination, including human factors and operational pressures. The outcomes of these discussions will be shared across the aviation sector for broader applicability. The fall 2024 issue of the ASL will also emphasize the importance of addressing contaminated surfaces as winter approaches.

Starting this fiscal year, TC is undertaking the following actions:

- Conducting ground icing operations Compliance Inspections at northern remote aerodromes when ground icing conditions are present (addressing TSB concerns about remote aerodromes).
- Adding a ground icing operations Compliance Inspection to the yearly surveillance plan. It has been added to the list for the 2025-26 National Oversight Plan (NOP) as well.
- Providing training to the Transport Canada Civil Aviation (TCCA) operations inspectors on aircraft de-icing and anti-icing practices, including the regulations, the use of the Holdover Time (HOT) guidelines, and the de-icing/anti-icing fluid types.

Furthermore, a quarterly reporting dashboard is now being shared with the Analysis and Occurrence, Planning and Reporting committee for ongoing evaluation, ensuring continuous improvement in addressing de-icing and anti-icing challenges in northern and remote communities.

March 2025: TSB assessment of the response (Unable to Assess)

In its response, Transport Canada (TC) reiterated that it agrees with Recommendation A18-02.

Since the last TSB assessment, TC's De-Ice in Northern and Remote Communities (DNRC) Working Group has concluded that a register of de-icing equipment was ineffective as a risk mitigation measure for the safety deficiency identified in Recommendation A18-02. According to TC, this was due to the dynamic nature of the industry, where de-icing equipment is typically provided by third-party contractors based on demand rather than being permanent fixtures.

The Board disagrees with TC's above conclusion. The safety deficiency identified in Recommendation A18-02 is that there is an increased likelihood of aircraft taking off with frost, ice, or snow adhering to any critical surface at locations where de-icing and anti-icing equipment is not available or is inadequate. If TC identifies these locations, with the collaboration of air and airport operators, and takes urgent action to ensure the equipment is available, there is a potential to substantially mitigate the risk associated with the safety deficiency identified in the recommendation.

Without ensuring that operators are providing this equipment, flight crews are susceptible to repeating the actions that occurred leading up to the accident in Fond-du-Lac, Saskatchewan,

and the risks associated with the safety deficiency identified over 6 years ago in Recommendation A18-02 will remain.

The Board acknowledges that TC plans on taking steps to engage with industry stakeholders through various channels, such as the Canadian Aviation Safety Collaboration Forum, the Air Taxi Safety Campaign, articles in the *Aviation Safety Letter*,² and the Standing Committee on Operations Under Icing Conditions. While TC's planned ground icing compliance inspections at northern remote aerodromes when icing conditions are present may mitigate the safety deficiency identified in Recommendation A18-03 (also related to TSB air safety investigation A17C0146), it remains unclear whether the actions planned will mitigate the safety deficiency identified in Recommendation A18-02.

Therefore, the Board is **Unable to Assess** the response to Recommendation A18-02.

Latest response and assessment

September 2025: response from Transport Canada

Transport Canada (TC) agrees with the recommendation.

TC conducted Ground Icing Compliance Inspections at several northern and remote aerodromes during the 2024–25 winter season. However, due to the unpredictable nature of meteorological conditions, only one inspection was carried out under active ground icing conditions. To further address this safety concern, TC plans on expanding its inspection efforts during the 2025–26 winter period, with additional Ground Icing Compliance Inspections at northern and remote locations.

As part of its broader strategy, TC is preparing to incorporate Ground Icing Compliance Inspection Worksheets into the new surveillance program scheduled for implementation in 2026. This initiative aims to standardize inspection practices and improve data collection related to ground icing operations.

In parallel, TC is developing recommendations to address potential equipment deficiencies at northern and remote aerodromes. An issue paper outlining these recommendations is currently being prepared and is expected to be finalized by December 2025.

Through 2025, TC has met with industry stakeholders and continues to engage with them to identify collaborative solutions that mitigate risks associated with the availability of de-icing and anti-icing equipment in remote regions.

To support operational oversight, TC has developed a comprehensive training program for Civil Aviation Safety Inspectors focused on aircraft de-icing and anti-icing procedures. The training

² Transport Canada, "Ensuring Safe Winter Operations: Best Practices for De/Anti-icing in Aviation," in *Aviation Safety Letter*, Issue 3/2024, available at <https://tc.canada.ca/en/aviation/publications/aviation-safety-letter/aviation-safety-letter-issue-3-2024> (last accessed on 29 April 2025).

covers regulatory requirements, Holdover Time (HOT) guidelines, and the appropriate use of de-icing and anti-icing fluids. TC is currently evaluating options to integrate this course into the inspector training schedule aligned with the launch of the new surveillance procedures in 2026.

Furthermore, TC continues to engage with industry stakeholders through various channels, such as the Canadian Aviation Safety Collaboration Forum (CASCF), the Air Taxi Safety Campaign (ATSC), and the Aviation Safety Letter (ASL). As previously shared, at the April 2024 CASCF, critical surface contamination was a major topic of discussion. These forums are crucial for sharing information on aircraft de/anti-icing and addressing operational challenges.

Since the last update (September 2024), TC has continued to build this topic into its ATSC. The working group, comprised of industry members and TC, has identified this as a significant operating pressure and is developing materials to be shared across the 703-sector, as well as the broader aviation industry, to highlight the importance of safety culture within the industry and organizations around the topic. The publication of these materials is estimated to be in early 2026.

Additionally, every fall, the ASL features articles on the importance of reducing the likelihood of aircraft taking off with contaminated critical surfaces.

These initiatives reflect TC's continued efforts to respond to Recommendation A18-02 and to strengthen safety practices in northern and remote communities through compliance inspections, enhanced training, and collaborative engagement with industry stakeholders.

March 2026: TSB assessment of the response (Unsatisfactory)

In its latest response, Transport Canada (TC) reiterated that it agrees with Recommendation A18-02.

Since the last update in September 2024, TC conducted Ground Icing Compliance Inspections at several northern and remote aerodromes during the 2024–25 winter season. However, due to unpredictable weather conditions, only one inspection took place during active ground icing. While TC planned to expand these inspections during the 2025–26 winter season, this work was delayed due to organizational priorities. TC also reported progress in preparing ground icing compliance inspection worksheets for inclusion in the new surveillance program scheduled for implementation in 2026. In addition, TC is developing recommendations to address potential equipment deficiencies at northern and remote aerodromes and had expected to finalize an issue paper in December 2025; however, at the time of this assessment, it has not yet been completed. Inspector training in aircraft de-icing and anti-icing practices is also being developed for future integration into the new surveillance procedures.

The Board acknowledges these activities. However, TC's response does not demonstrate that it is effectively overseeing air operators to ensure that they are providing adequate de-icing and anti-icing equipment and capability at the locations where they operate. This is the central intent of Recommendation A18-02. Moreover, in February 2026, TC informed the TSB that the issue paper and related recommendations have yet to be finalized. According to TC, the issue

paper is expected to examine options to strengthen surveillance and address the identified safety concerns; however, due to the complexity of the file, analysis is ongoing, and conclusions have not yet been finalized.

Additionally, plans by the Air Taxi Safety Campaign to publish material in early 2026 on aircraft de-icing and anti-icing procedures to be shared across the *Canadian Aviation Regulations* (CARs) Subpart 703 operators, as well as the broader aviation industry, have been further delayed.

Although inspections, worksheets, training, and outreach may support improvements in general oversight, TC has not provided evidence that its surveillance framework includes concrete mechanisms to confirm that operators have ensured that appropriate de-icing and anti-icing equipment is available in northern and remote regions. TC has also not demonstrated that it uses surveillance to ensure that adequate de-icing and anti-icing capability is in place nor has it presented a time-bound oversight plan that would achieve this outcome.

More than 7 years have passed since the recommendation was issued, and there remains no precise plan or timeline to ensure that operators consistently meet their responsibility to provide de-icing and anti-icing capability that prevents takeoffs with contaminated surfaces in these locations.

Without clear and enforceable oversight measures that verify operators' de-icing and anti-icing capabilities, flight crews may continue to operate at locations where they do not have access to appropriate de-icing and anti-icing equipment. As a result, the risks associated with the safety deficiency identified in Recommendation A18-02 remain.

Therefore, the Board considers the response to Recommendation A18-02 to be **Unsatisfactory**.

File status

The TSB will continue to monitor TC's collaboration with air and airport operators to ensure that proper de-icing and anti-icing equipment is available to reduce 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**.