

November 16, 2022

Aviation Investigation Report AIR-22-09

Implement Special Federal Aviation Regulation for Air Tours near Ketchikan, Alaska

Introduction

The National Transportation Safety Board (NTSB) is providing the following information to urge the Federal Aviation Administration (FAA) and the National Weather Service to take action on the safety recommendations in this report. These recommendations are derived from findings from the investigation of an August 2021 air tour airplane accident in Ketchikan, Alaska, as well as from our review of previous investigations of Title 14 *Code of Federal Regulations (CFR)* Part 135 air tour airplane accidents near Ketchikan since 2007.¹ As discussed in this report, despite the FAA's efforts since 2008 to encourage operators to voluntarily adopt processes and procedures to improve the safety of air tour airplane flights in the Ketchikan area, these operations continue to be vulnerable to the hazards unique to the area's terrain and weather conditions. The NTSB is issuing three new safety recommendations, two of which supersede previously issued safety recommendations.

Background and Analysis

On August 5, 2021, a De Havilland DHC-2 airplane, N1249K, which was operated as a Part 135 air tour, impacted heavily wooded, mountainous terrain near Ketchikan. The pilot and five passengers were fatally injured, and the airplane was destroyed. A review of weather camera imagery, forecasts, weather observations, and passenger photographs revealed that while the pilot was conducting the flight under visual flight rules (VFR), the airplane entered a narrow valley and encountered deteriorating weather. As the cloud cover increased and visibility was reduced due to precipitation and mist, passenger photographs show that the pilot flew at lower altitudes, consistent with a passenger report from the pilot's previous flight where he attempted to remain below the cloud ceiling and avoid entering instrument meteorological conditions (IMC). On the accident flight, the airplane impacted

¹ Appendix A contains a list of investigations that support these safety recommendations.

mountainous terrain in IMC.² The NTSB determined the probable cause of this accident to be, in part, “the pilot’s decision to continue visual flight rules (VFR) flight into instrument meteorological conditions (IMC), which resulted in controlled flight into terrain.”

Based on passenger photographs and videos, the accident pilot likely flew close to the right side of the valley where the accident occurred. Ketchikan air tour pilots typically fly along the side of valleys to avoid collisions with other aircraft or to provide more room to reverse course if they observe deteriorating weather ahead, such as low clouds or poor visibility (see the accident valley in figure 1). However, many valleys in the area are too narrow for an airplane to make a full 180° turn to avoid entering or to escape an inadvertent entry into IMC.³ In postaccident interviews, two pilots familiar with the valley where the accident occurred stated that they thought it was likely too narrow to safely execute a 180° turn in an airplane.

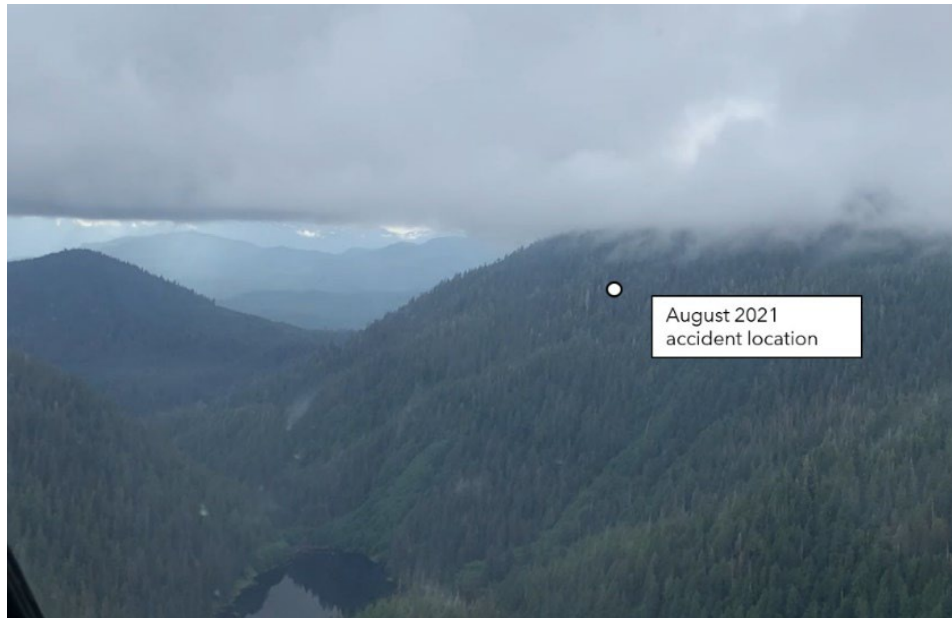


Figure 1. August 2021 accident location with obscured mountaintops and reduced visibility. (Source: NTSB)

Note: The picture was taken at a later date during the NTSB’s investigation of the August 2021 accident.

² Visit [ntsb.gov](https://www.ntsb.gov) to find additional information in the [public docket](#) for this NTSB investigation (case number [ANC21FA069](#)). Use the [CAROL Query](#) to search safety recommendations and investigations.

³ A valley that is too narrow for an airplane to turn around in may allow for an air tour helicopter to turn around because it has more maneuverability than an airplane. Some Ketchikan operators also instruct pilots of float-equipped airplanes who are caught in localized cloud cover to temporarily land on a lake—if the valley has one—rather than attempt to navigate in the clouds; however, many valleys in the area do not have lakes suitable for landing.

During Ketchikan's high-traffic air tour season between April and September, about a dozen operators conduct Part 135 air tours, flying airplanes as low as 500 ft above ground level (agl) so passengers can view the remote, rugged terrain of the southeastern portion of the Alaskan Panhandle near the Misty Fjords National Monument.⁴ A review of NTSB accident investigations between 2007 and 2021 identified seven Part 135 air tour airplane accidents (five fatal, including the above accident) in the Ketchikan area, in which 31 people died and 13 were seriously injured. Of the five fatal air tour airplane accidents, three involved VFR flight into IMC.⁵

Pilots conduct air tours such as the accident flight under VFR to facilitate passengers' view of the landscape. However, cloudy and rainy conditions are regularly present around the Ketchikan area due to a persistent onshore wind from the southwest that carries abundant moisture from the Pacific Ocean.⁶ In addition, the persistent weather systems in the southeastern Alaska Panhandle, which create the area's temperate rainforest, can funnel wind and precipitation into the area's valleys, with clouds increasing as the weather systems encounter the mountains. These weather patterns helped create the type of rapidly changing, localized cloud cover that the air tour involved in the August 2021 accident encountered. Passenger photographs show that the top of the mountainous terrain near the accident location was obscured by cloud cover (see figure 2). Airplane pilots are at risk of impacting the area's high terrain if they continue into cloudy conditions that obscure mountains, which may not be obvious when pilots turn to enter valleys.

⁴ a) The number of Ketchikan air tour operators varies by year; in 2019, there were 14 operators, and in 2021, there were 10 operators. b) When the FAA issued its final rule for 14 *CFR* Part 136 Subpart A, "National Air Tour Safety Standards," in 2007, it noted that air tours across the country are normally conducted between 500 and 1,500 ft agl. National Archives and Records Administration (NARA). 2007. "National Air Tour Safety Standards; Final Rule." *Federal Register*. Vol. 72. Washington, DC: NARA, February 13, 2007. 6883.

⁵ Of the remaining two fatal air tour accidents, one involved takeoff into high wind conditions, and the other involved a midair collision with another aircraft. Of the two nonfatal air tour accidents, one involved a water takeoff, and the other involved a water landing.

⁶ With an average yearly rainfall of about 150 inches, Ketchikan is one of the rainiest cities in Alaska. For more precipitation information, see the Western Regional Climate Center's [Climate Summary for Ketchikan](#).



Figure 2. Photographs taken by passengers from the August 2021 accident flight. (Source: NTSB)

The minimum flight altitude, ceiling, and visibility requirements that apply to Part 135 airplane operations across the country, including air tours in the Ketchikan area, specify that airplanes must fly above 500 ft agl (14 *CFR* 135.203) and, when the ceiling is less than 1,000 ft agl, flight visibility must be at least 2 statute miles (14 *CFR* 135.205). Further, when operating in class G airspace, such as that in the vicinity of the accident site, daytime VFR airplane flights are required only to remain clear of clouds (14 *CFR* 91.155).⁷ During postaccident interviews as part of the August 2021 accident investigation, the director of operations from another Ketchikan air tour operation stated that area air tour pilots routinely need to decide whether the current weather conditions are good enough to safely fly VFR.

To address the operational hazards of flying air tours in the Ketchikan area's terrain and weather conditions, operators active in Ketchikan established a voluntary letter of agreement (LOA) in 2009 that was intended to foster compliance with

⁷ The national air tour standards (14 *CFR* Part 136 Subpart A) do not address minimum flight altitudes or visibility; they do address passenger briefings, life preservers, and helicopter-specific items.

operational elements such as standard routes, reporting points, and best practices.⁸ Although the operator of the August 2021 accident flight was a signatory of this voluntary LOA, compliance with the LOA was not required, and the accident pilot was not following the standard routes in the LOA at the time of the accident as shown in figure 3.

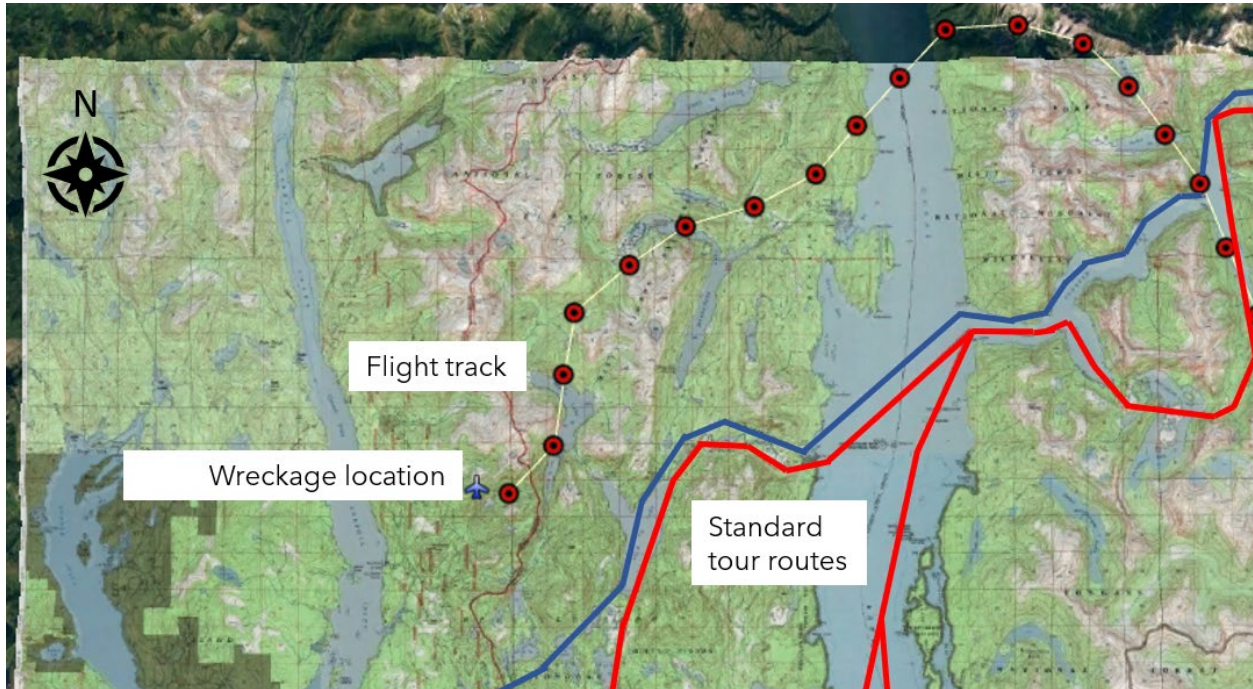


Figure 3. August 2021 accident flight track compared to the standard tour routes in the LOA. (Source: Tongass Aircraft Pilots Association)

Note: The red lines are the LOA's outbound standard routes, the blue line is the LOA's inbound standard route, and the yellow line with red dots is the accident airplane's flight track.

During postaccident interviews as part of the August 2021 investigation, personnel from two participating Ketchikan operations said that their employers were doing their best to follow the operational elements of the LOA, but the personnel stressed that it was a voluntary agreement. In addition, two pilots and one FAA

⁸ a) Originally created by Tongass Aircraft Pilots Association operators on January 15, 2009, and updated at least twice since in response to subsequent accidents, the LOA covers standard tour routes, frequencies, altitudes, reporting points, choke points, nonstandard routes, and best practices but does not include weather minimums. The LOA was last updated on May 8, 2021, and 10 operators were signatories at that time. The Tongass Aircraft Pilots Association was originally formed to address safety issues, air traffic congestion, communications, and noise considerations in southeast Alaska. For more information, including a copy of the most recent version of the LOA, see the [Tongass Aircraft Pilots Association website](#). b) The Ketchikan operator LOA, which is a voluntary local agreement by area operators, is not a letter of authorization required by the FAA for air tour flights that begin and end at the same airport and are conducted within 25 statute miles, as identified in 14 CFR 119(e)(2).

inspector described how pilots would deviate from the operational elements in the LOA, such as by flying nonstandard routes. The FAA inspector also said the FAA was limited to encouraging voluntary participation and that the continuing accidents since the operators established the LOA in 2009 showed that the LOA was not effective. The NTSB determined that the FAA's reliance on voluntary compliance with the LOA was a contributing factor in the August 2021 accident.

Weather Minimums and Voluntary Operator Safety Actions

For Ketchikan-area air tours, the rapidly changing weather conditions specific to the region and the surrounding mountainous terrain represent overlapping hazards, and Part 135 VFR minimums often provide an insufficient safety margin to enable air tour pilots to avoid entering or escaping an inadvertent encounter with IMC in that environment. Based on our findings in the investigations of several fatal air tour accidents that occurred in the Ketchikan and Southeast Alaska area, the NTSB issued 13 total safety recommendations to the FAA in 2008 and 2017 aimed at improving air tour safety in the Ketchikan area; however, many of the resulting solutions adopted by the FAA involved voluntary operator actions that have proven ineffective or are no longer in effect.⁹

We issued the first four safety recommendations, A-08-59 through -62 (which focused on weather, training, and FAA oversight of safe flying practices), following a fatal July 2007 accident in Ketchikan and four similar accidents in southeast Alaska.¹⁰ Although we classified these four safety recommendations as either "Closed–Acceptable Action" or "Closed–Acceptable Alternate Action" based on the FAA's actions, we later found that air tour operators in Southeast Alaska continued certain unsafe flying practices, such as conducting flights below FAA minimum altitudes and

⁹ Appendix B lists the NTSB's 13 previously issued safety recommendations that addressed the weather, route, and terrain hazards in Southeast Alaska.

¹⁰ For additional information about the five accidents near Ketchikan and Juneau referenced in the 2008 report, search the [public docket](#) for case numbers [ANC99FA073](#), [ANC99FA139](#), [ANC01FA093](#), [ANC06LA066](#), and [ANC07FA068](#). For more information on the 2008 recommendations, see NTSB. 2008. [Letter from Chairman Mark V. Rosenker to Robert A. Sturgell, Administrator, Federal Aviation Administration, issuing Safety Recommendations A-08-59 through -62, July 31](#). Washington, DC: NTSB.

VFR weather minimums, and that some of the actions taken by the FAA in response to our recommendations, including training, were no longer in effect.¹¹

Following the July 2007 accident, the accident operator made voluntary operational changes, including signing the voluntary operator LOA and imposing a 4-mile flight visibility minimum for its flights in the Ketchikan area, which was more conservative than the 2-mile requirement specified in 14 *CFR* 135.205.¹² The July 2007 accident operator maintained this more conservative visibility minimum and, on June 25, 2015, it cancelled its air tours because weather conditions were below its more restrictive voluntary minimum. However, another local operator booked passengers from those cancelled air tours that day; one of the rebooked air tour flights encountered IMC and collided with mountainous, tree-covered terrain, resulting in nine fatalities.

Following our investigation of the June 2015 accident, the NTSB issued Safety Recommendation A-17-43 asking the FAA to do the following:

Develop and implement special operating rules for the Ketchikan air tour industry that include en route visual flight rules weather minimums that are tailored to the industry's unique requirements and are more conservative than those specified in 14 *Code of Federal Regulations* Part 135.¹³

On July 21, 2017, the FAA responded that it was evaluating policy and rulemaking options to address this recommendation. The FAA also reported that, through its controlled flight into terrain initiative, the agency would focus on operators' voluntary adoption of safety items including "visual flight rules route structures, segmented altitudes, higher weather minimums, specific decision points,

¹¹ Safety Recommendation A-08-60 asked the FAA to provide monthly en route and ground-based observations of air tour flights in Southeast Alaska. In response, the FAA stated that it had permanently added en route inspections of air tour operators to FAA Order 1800.56, "National Flight Standards Work Program," and established a special emphasis program to ensure surveillance in southeast Alaska. In 2014, the NTSB classified Safety Recommendation A-08-60 as "Closed–Acceptable Alternate Action." Safety Recommendations A-08-61 and -62, which focused on training, are addressed in the next section. See appendix B for more information about Safety Recommendation A-08-59, which focused on weather cameras.

¹² For more information, see NTSB. 2017. *Collision with Terrain, Promech Air, Inc., de Havilland DHC-3, N270PA, Ketchikan, Alaska, June 25, 2015*. Aircraft Accident Report NTSB/[AAR-17/02](#). Washington, DC: NTSB.

¹³ As part of the June 2015 accident investigation, the NTSB also issued Safety Recommendations A-17-35 through -43, which addressed weather, terrain, operations, and FAA oversight. See appendix B for more information about these safety recommendations.

and additional training items.” Because those safety items, if widely adopted by air tour pilots in the Ketchikan area, would have improved the safety of Part 135 air tour flights in the area, on October 26, 2017, the NTSB classified Safety Recommendation A-17-43 “Open–Acceptable Response.” When we did not receive additional information about the FAA’s further actions, on July 22, 2020, we classified the safety recommendation “Open–Unacceptable Response.”

In a March 24, 2022, response, the FAA stated that the FAA Alaska Aviation Safety Initiative (FAASI) team issued its final report on September 30, 2021, which discussed, in part, the need for improved weather reporting facilities.¹⁴ The FAA said the FAASI, which is a comprehensive approach tailored to safety issues specific to Alaska, will focus on improving weather reporting. The FAA also indicated that because Safety Recommendation A-17-43 will be included as part of the agency’s ongoing efforts to implement the FAASI’s recommended actions, it was finished responding to A-17-43. The NTSB notes that although the FAASI report included two recommendations to improve weather reporting in Alaska, it neither addressed the weather and terrain operational hazards in the Ketchikan area nor proposed requiring more conservative weather minimums.

In response to continued fatal accidents involving air tour aircraft in other geographic areas with distinct operational hazards, the FAA has previously developed and implemented special federal aviation regulations (SFARs).¹⁵ SFARs establish minimum flight altitudes and airspace limitations for certain geographic areas, among other procedural and operational requirements that all operations are required to follow in specific locations, such as SFAR 50 for the Grand Canyon area and SFAR 71 in Hawaii.

¹⁴ The NTSB notes that the FAASI report is responsive to Safety Recommendation A-20-11. Issued in 2020 following our September 2019 roundtable intended to improve the safety of Part 135 operations in Alaska, Safety Recommendation A-20-11 asked the FAA to “implement a safety-focused working group to review, prioritize, and integrate Alaska’s aviation safety needs into the FAA’s safety enhancement process.” The NTSB classified Safety Recommendation A-20-11 as “Open–Acceptable Response” on August 21, 2020, after the FAA’s initial response that it would determine the most effective way to form such a working group. This recommendation remained classified “Open–Acceptable Response” after the FAA’s January 19, 2021, response that it convened a working group of aviation stakeholders to guide safety initiatives in Alaska. For more information on Safety Recommendation A-20-11, see NTSB. 2020. *Revise Processes to Implement Safety Enhancements for Alaska Aviation Operations*. [ASR-20/02](#). Washington, DC: NTSB.

¹⁵ Unlike the special operating rules recommended in Safety Recommendation A-17-43, which could include voluntary or recommended items, SFARs are regulatory requirements and are enforceable by the FAA.

Implemented in 2018, SFAR 50 addressed airspace limitations, aircraft operations, flight-free zones, and minimum flight altitudes in the Grand Canyon.¹⁶ In 1994, SFAR 71 established procedural, operational, and equipment safety requirements for air tour helicopters and minimum flight altitudes for all air tours in the state of Hawaii. In 2003, the FAA stated that SFAR 71 had been effective at decreasing the fatality rate for air tour accidents in Hawaii since it was established.¹⁷

The continuing fatal Part 135 air tour accidents in the Ketchikan area show that current regulations and voluntary operator actions to implement more conservative weather minimums and address the weather and terrain operational hazards associated with air tours are insufficient. Thus, the NTSB concludes that the actions taken by the FAA to date to improve air tour airplane safety in the Ketchikan area have not effectively mitigated the risks associated with conducting VFR flight in the area's surrounding mountainous terrain and weather conditions. The NTSB also concludes that the distinct operational hazards unique to air tour airplane flights in the Ketchikan area warrant additional actions by the FAA and operators to ensure the safety of air tours. The FAA's development and implementation of an SFAR specific to the Ketchikan area would provide the FAA the ability to enforce air tour operators' adherence to these needed additional safety requirements.

In developing an SFAR, applying the knowledge of experts most familiar with weather conditions in the area would also be beneficial. The local National Weather Service could provide valuable input on safe weather conditions for flying. Local operators have already worked with the FAA to develop the voluntary operator LOA that includes many items that would prevent VFR flight into IMC, including standard tour routes, alternate routes for poor weather days, and reporting adverse weather

¹⁶ In 1987, the FAA established SFAR 50 for the Grand Canyon airspace in response to a June 1986 midair collision that resulted in 25 fatalities (DCA86AA028) and widespread attention on the safety of Grand Canyon air tour flights. After numerous legal challenges and revisions over the next 30 years, the FAA implemented SFAR 50 on March 5, 2018.

¹⁷ a) SFAR 71 was developed because of a marked increase in fatal accidents and insufficient voluntary measures. For more information on the effectiveness of SFAR 71 between 1994 and 2003, see NARA. 2003. "Air Tour Operators in the State of Hawaii; Final Rule." *Federal Register*. Vol. 68. Washington, DC: NARA, October 23. 60839. b) The NTSB's investigation of a December 2019 air tour helicopter accident in Hawaii found however, that the FAA has since authorized numerous air tour operators to deviate from the SFAR's 1,500-foot minimum altitude requirement, that the Honolulu FSDO's in-person surveillance of Hawaii air tour operators had decreased in the 3 years preceding the accident, and that some pilots in the local air tour community may have routinely engaged in risky weather-related operating practices. The FAA's routine surveillance of air tour flight operations is critical for ensuring the effectiveness of an SFAR and any related requirements. For more information about this accident investigation, see NTSB. 2022. [Collision into Terrain, Safari Aviation Inc., Airbus AS350 B2, N985SA, AIR-22-05](#). Washington, DC: NTSB.

conditions. But, as stated earlier, the voluntary nature of this program diminishes its effectiveness. Therefore, the NTSB recommends that the FAA, in collaboration with the local National Weather Service, develop and issue an SFAR for air tour airplane flights in the Ketchikan area that imposes weather minimums that are more conservative than those specified in Part 135 and requires the operational elements of the Ketchikan operators' voluntary LOA such as standard tour routes, alternate routes for poor weather days, and reporting adverse weather conditions. The NTSB also recommends that local National Weather Service staff work with the FAA to develop the SFAR in Safety Recommendation A-22-25 for air tour airplane flights in the Ketchikan area that imposes weather minimums that are more conservative than those specified in Part 135.

Because an SFAR, if implemented, would address the need for special operating rules concerning the weather and terrain hazards around Ketchikan in Safety Recommendation A-17-43, and because the FAA considers its actions complete and plans no further action the NTSB classifies Safety Recommendation A-17-43 "Closed–Unacceptable Action/Superseded" and classifies Safety Recommendation A-22-25 "Open–Unacceptable Response."

Weather-Related Training

In 2008, the NTSB issued Safety Recommendations A-08-61 and -62, which asked the FAA to develop a cue-based training that addressed Ketchikan weather hazards and to require that local operators regularly provide that training to their pilots. Cue-based training programs expose pilots to realistic depictions of deteriorating in-flight weather to foster an ability to accurately assess and respond appropriately to cues associated with deteriorating weather.

In response to those safety recommendations and in cooperation with the Medallion Foundation, the FAA developed cue-based training that was conducted in Medallion's approved basic aviation training device (BATD), and air tour operators voluntarily incorporated these concepts into their FAA-approved training programs.¹⁸ As a result, the NTSB classified Safety Recommendations A-08-61 and -62 "Closed–Acceptable Action" and "Closed–Acceptable Alternate Action," respectively.

¹⁸ The Medallion Foundation, a non-profit Alaskan safety organization, was established by a state industry group of air carriers to improve pilot safety awareness and reduce air carrier insurance rates. Between 2002 and 2019, it received funding from the FAA to, among other things, administer safety initiatives including the purchase and maintenance of flight training devices, passenger safety awareness campaigns, and management of the Aviation Safety Action Program. The Medallion Foundation ceased operation in 2019.

We issued similar cue-based training recommendations in 2007 for Hawaii air tour operations.¹⁹ The FAA's March 8, 2011, response to the Hawaii air tour recommendations indicated that it had established a cue-based weather training project management team to develop and produce "high quality, comprehensive, expert-vetted, cue-based weather and in-flight decision-making visual training aids" for air tour operators in both Hawaii and Alaska. However, during the investigation of the December 2019 air tour helicopter accident in Hawaii noted previously, we found the FAA's commitment to taking such action had diminished over time, and it instead attempted to shift responsibility for developing cue-based training to the air tour operators.²⁰

We have expressed similar concerns to the FAA regarding the cue-based training in Ketchikan developed by Medallion. During the NTSB's investigation of the June 2015 air tour accident in Ketchikan, investigators discovered that the cue-based training module that the accident pilot had completed using Medallion's BATD had limited effectiveness because the ceiling height and forward visibility depicted on the BATD did not portray the dynamic, variable, and localized patterns that often characterize real-world weather conditions, and the terrain features and ground texture were not photorealistic.²¹ Based on these and other investigative findings, in 2017, the NTSB issued Safety Recommendation A-17-37, which asked the FAA to do the following:

Work with members of the Ketchikan air tour industry to improve existing training programs aimed at reducing the risk of weather-related accidents involving continuation of flight under visual flight rules into instrument meteorological conditions, with special attention paid to the human factors issues identified in this investigation, including (1) the need to help pilots better calibrate what constitutes safe weather conditions to conduct flights based on objective standards and requirements, such as set criteria for what landmarks must be clearly

¹⁹ Based on our investigation of a 2004 helicopter accident in Hawaii involving VFR flight into IMC, we issued Safety Recommendation A-07-18 and -19, which asked the FAA to develop and require a cue-based training program for commercial air tour pilots in Hawaii. For more information on this accident investigation, see NTSB. 2007. *Weather Encounter and Subsequent Collision into Terrain, Bali Hai Helicopter Tours, Inc., Bell 206B, N16849, Kalaheo, Hawaii, September 24, 2004*. AAR-07/03. Washington, DC: NTSB.

²⁰ As part of the December 2019 accident investigation, we classified Safety Recommendations A-07-18 and -19 as "Open–Unacceptable Response."

²¹ For more information, see NTSB. 2017. *Collision with Terrain, Promech Air, Inc., de Havilland DHC-3, N270PA, Ketchikan, Alaska, June 25, 2015*. Aircraft Accident Report NTSB/[AAR-17/02](#). Washington, DC: NTSB.

visible from which locations in order to proceed on a particular route; (2) the need to help pilots who are new to the area recognize dynamic local weather patterns that can place them in a dangerous situation; and (3) operational influences on pilot decision-making.

On July 21, 2017, the FAA responded that it was addressing the safety recommendation through its biannual meetings with Ketchikan operators and its safety campaigns addressing controlled flight into terrain, avionics training, and cue-based training. Because we believed those efforts could address the safety recommendation, on October 26, 2017, the NTSB classified Safety Recommendation A-17-37 "Open–Acceptable Response."

On February 17, 2020, the FAA responded that it had worked with operators to approve voluntary cue-based training; that operators had used Medallion to share best practices and improve their safety programs; and that operators trained new pilots before the start of each tour season. The FAA indicated that because these actions improved existing training programs, it was finished responding to A-17-37.

However, Medallion closed in 2019, and the BATD it used for cue-based training is no longer available to air tour pilots.²² In addition, we responded that the FAA cannot effectively oversee and ensure the effectiveness of cue-based training that individual operators implement, including the cue-based training the June 2015 accident pilot received, because the training is not required. Following the closure of Medallion in 2019 and because of the limited effectiveness of voluntary operator training, on July 22, 2020, we classified the safety recommendation "Open–Unacceptable Response."

On April 19, 2022, the FAA responded to Safety Recommendation A-17-37 that it continues to hold biannual safety meetings with air tour operators in Southeast Alaska and that the voluntary operator LOA improves aviation safety; however, the FAA did not specify how these actions improved training programs. The FAA indicated that because its actions to date were responsive to our July 2020 response, it is finished responding to A-17-37. However, as we noted previously, the cue-based training that the FAA developed in conjunction with Medallion for use by Alaska air tour operators—which Safety Recommendation A-17-37 sought to improve—no longer exists.

²² According to one Ketchikan director of operations interviewed as part of the August 2021 accident investigation, Medallion's cue-based training simulators are now owned by the Civil Air Patrol and are no longer available to Ketchikan air tour pilots.

The NTSB concludes that the August 2021 accident and other weather-related fatal air tour airplane accidents in the Ketchikan area since 2007 demonstrate the continued need for improved pilot training on reducing the risk of weather-related accidents involving continuation of flight under VFR into IMC. Therefore, the NTSB recommends that the FAA develop and require training for all Ketchikan air tour airplane pilots aimed at reducing the risk of weather-related accidents involving continuation of flight under VFR into IMC. The training should include (1) objective standards, such as landmarks that must be clearly visible from particular locations that pilots can use to determine whether weather conditions are safe for continued flight on a particular route; and (2) a module that helps pilots recognize dynamic local weather patterns that can place them in a dangerous situation.

Because the FAA has only relied on voluntary actions by operators in response to Safety Recommendation A-17-37, they have not effectively improved pilot training to reduce weather-related accidents involving continuation of VFR flights into IMC, and because the FAA considers its actions complete and plans no further action, the NTSB classifies Safety Recommendation A-17-37 “Closed–Unacceptable Action/Superseded” and classifies Safety Recommendation A-22-26 “Open–Unacceptable Response.”

Conclusions

Findings

The actions taken by the Federal Aviation Administration to date to improve air tour airplane safety in the Ketchikan area have not effectively mitigated the risks associated with conducting visual flight rules flight in the area’s surrounding mountainous terrain and weather conditions.

The distinct operational hazards unique to air tour airplane flights in the Ketchikan area warrant additional actions by the Federal Aviation Administration and operators to ensure the safety of air tours.

The August 2021 accident and other weather-related fatal air tour airplane accidents in the Ketchikan area since 2007 demonstrate the continued need for improved pilot training on reducing the risk of weather-related accidents involving continuation of flight under visual flight rules into instrument meteorological conditions.

Recommendations

To the Federal Aviation Administration:

In collaboration with the local National Weather Service, develop and issue a special federal aviation regulation for air tour airplane flights in

the Ketchikan area that imposes weather minimums that are more conservative than those specified in Title 14 *Code of Federal Regulations* Part 135 and requires the operational elements of the Ketchikan operators' voluntary letter of agreement such as standard tour routes, alternate routes for poor weather days, and reporting adverse weather conditions. (A-22-25) (Supersedes Safety Recommendation A-17-43 and is classified "Open–Unacceptable Response")

Develop and require training for all Ketchikan air tour airplane pilots aimed at reducing the risk of weather-related accidents involving continuation of flight under visual flight rules into instrument meteorological conditions. The training should include (1) objective standards, such as landmarks that must be clearly visible from particular locations that pilots can use to determine whether weather conditions are safe for continued flight on a particular route; and (2) a module that helps pilots recognize dynamic local weather patterns that can place them in a dangerous situation. (A-22-26) (Supersedes Safety Recommendation A-17-37 and is classified "Open–Unacceptable Response")

To the National Weather Service:

Work with the Federal Aviation Administration to develop the special federal aviation regulation in Safety Recommendation A-22-25 for air tour airplane flights in the Ketchikan area that imposes weather minimums that are more conservative than those specified in Title 14 *Code of Federal Regulations* Part 135. (A-22-27)

Previously Issued Recommendations Classified in This Report

The National Transportation Safety Board classifies the following safety recommendations.

To the Federal Aviation Administration:

Work with members of the Ketchikan air tour industry to improve existing training programs aimed at reducing the risk of weather-related accidents involving continuation of flight under visual flight rules into instrument meteorological conditions, with special attention paid to the human factors issues identified in this investigation, including (1) the need to help pilots better calibrate what constitutes safe weather conditions to conduct flights based on objective standards and requirements, such as set criteria for what landmarks must be clearly

visible from which locations in order to proceed on a particular route; (2) the need to help pilots who are new to the area recognize dynamic local weather patterns that can place them in a dangerous situation; and (3) operational influences on pilot decision-making. (A-17-37)

Safety Recommendation A-17-37 is classified “Closed–Unacceptable Action/Superseded” in this report.

Develop and implement special operating rules for the Ketchikan air tour industry that include en route visual flight rules weather minimums that are tailored to the industry’s unique requirements and are more conservative than those specified in 14 *Code of Federal Regulations* Part 135. (A-17-43)

Safety Recommendation A-17-43 is classified “Closed–Unacceptable Action/Superseded” in this report.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

JENNIFER HOMENDY

Chair

MICHAEL GRAHAM

Member

BRUCE LANDSBERG

Vice Chairman

THOMAS CHAPMAN

Member

Report Date: November 16, 2022

Appendixes

Appendix A: Previous NTSB Accident Investigations

Table. NTSB airplane accident investigations near Ketchikan, Alaska, involving Title 14 Code of Federal Regulations (CFR) Part 135 air tour operations (2004-2021)²³

Accident	Date	Accident Circumstance	Fatalities and Serious Injuries
ANC21FA069	8/5/2021	Terrain collision after visual flight rules (VFR) into instrument meteorological conditions (IMC)	6 fatalities
CEN19MA141	5/13/2019	Midair collision with another airplane	6 fatalities, 9 serious injuries
GAA18CA321	6/1/2018	Loss of pitch and directional control during water landing	None
ANC17LA032	6/18/2017	Failure to maintain clearance from water after takeoff	None
ANC15MA041	6/25/2015	Terrain collision after VFR into IMC	9 fatalities
ANC07MA083	8/16/2007	Takeoff into high wind conditions	5 fatalities, 4 serious injuries
ANC07FA068	7/24/2007	Terrain collision after VFR into IMC	5 fatalities

²³ Visit [ntsb.gov](https://www.ntsb.gov) to find additional information in the [public docket](#) for each NTSB accident investigation. Use the [CAROL Query](#) to search safety recommendations and investigations.

Appendix B: Previously Issued Safety Recommendations to the Federal Aviation Administration

Number	Classification	Date Closed	Recommendation
<i>Closed Recommendations</i>			
A-08-59	Closed– Acceptable Action	6/7/2011	Install and maintain weather cameras at critical areas of air tour routes within the Misty Fjords National Monument and other scenic areas in Southeast Alaska that are frequently traveled by air tour operators.
A-08-60	Closed– Acceptable Alternate Action	3/21/2014	Develop a permanent mechanism to provide en route and ground-based observations of air tour flights in Southeast Alaska at least once a month during the tour season to ensure operators are adhering to safe flying practices.
A-08-61	Closed– Acceptable Action	3/28/2012	Develop, in cooperation with Southeast Alaska commercial air tour operators, aviation psychologists, and meteorologists, among others, a cue-based training program for commercial air tour pilots in Southeast Alaska that specifically addresses hazardous aspects of local weather phenomena and in-flight decision-making.
A-08-62	Closed– Acceptable Alternate Action	6/14/2012	Once a cue-based training program that specifically addresses hazardous aspects of local weather phenomena and weather-related, decision-making issues is developed as requested in Safety Recommendation A-08-61, require all commercial air tour operators in Southeast Alaska to provide initial and recurrent training in these subjects to their pilots.
A-17-36	Closed– Acceptable Action	10/26/2017	Discuss at the next Ketchikan Air Safety meeting the database and software considerations for legacy Chelton systems and encourage operators to use the most current terrain database and electronic flight instrument system software.
<i>Open Recommendations</i>			
A-07-18	Open– Unacceptable Response	N/A	In cooperation with Hawaii commercial air tour operators, aviation psychologists, and meteorologists, among others, develop a cue-based training program for commercial air tour pilots in Hawaii that specifically addresses hazardous aspects of local weather phenomena and in-flight decision-making.

Number	Classification	Date Closed	Recommendation
A-07-19	Open– Unacceptable Response	N/A	Once a cue-based training program that specifically addresses hazardous aspects of local weather phenomena and weather-related, decision-making issues is developed (as requested in Safety Recommendation A-07-18), require all commercial air tour operators in Hawaii to provide this training to newly hired pilots.
A-17-35	Open– Acceptable Response	N/A	Implement ways to provide effective terrain awareness and warning system (TAWS) protections while mitigating nuisance alerts for single-engine airplanes operated under 14 <i>Code of Federal Regulations</i> Part 135 that frequently operate at altitudes below their respective TAWS class design alerting threshold.
A-17-37	Open– Unacceptable Response	N/A	Work with members of the Ketchikan air tour industry to improve existing training programs aimed at reducing the risk of weather-related accidents involving continuation of flight under visual flight rules into instrument meteorological conditions, with special attention paid to the human factors issues identified in this investigation, including (1) the need to help pilots better calibrate what constitutes safe weather conditions to conduct flights based on objective standards and requirements, such as set criteria for what landmarks must be clearly visible from which locations in order to proceed on a particular route; (2) the need to help pilots who are new to the area recognize dynamic local weather patterns that can place them in a dangerous situation; and (3) operational influences on pilot decision-making.
A-17-38	Open– Unacceptable Response	N/A	Expand the application of Federal Aviation Administration Order 8900.1, volume 3, chapter 19, section 6, "Safety Assurance System: Flight Training Curriculum Segments," paragraphs 3-1251(B) and 3-1252, which address controlled flight into terrain-avoidance training programs for 14 <i>Code of Federal Regulations</i> (CFR) Part 135 helicopter operations, to all 14 CFR Part 135 operations.

Number	Classification	Date Closed	Recommendation
A-17-39	Open– Unacceptable Response	N/A	Establish minimum initial and recurrent training requirements for personnel authorized to exercise operational control, including, but not limited to, approved subject knowledge areas, training hours, subject hours, and qualification modules.
A-17-40	Open– Acceptable Response	N/A	Publish an advisory circular that provides guidance on operational control best practices, including, but not limited to, such areas as risk mitigation strategies, joint flight safety responsibilities, prior experience of operational control personnel, and operational control personnel duty time limitations.
A-17-41	Open– Unacceptable Response	N/A	Revise Federal Aviation Administration Order 8900.1 to include guidance for inspector oversight of operational control training program subject areas, including, but not limited to, the criteria for a qualification module.
A-17-42	Open– Unacceptable Response	N/A	Analyze automatic dependent surveillance-broadcast data from Ketchikan air tour operations on an ongoing basis and meet annually with Ketchikan air tour operators to engage in a nonpunitive discussion of any operational hazards reflected in the data and collaborate on mitigation strategies for any hazards identified.
A-17-43	Open– Unacceptable Response	N/A	Develop and implement special operating rules for the Ketchikan air tour industry that include en route visual flight rules weather minimums that are tailored to the industry's unique requirements and are more conservative than those specified in 14 <i>Code of Federal Regulations</i> Part 135.
A-20-11	Open– Acceptable Response	N/A	Work with stakeholders that service the Alaska aviation industry to implement a safety-focused working group to review, prioritize, and integrate Alaska's aviation safety needs into the FAA's safety enhancement process.

The National Transportation Safety Board (NTSB) is an independent federal agency dedicated to promoting aviation, railroad, highway, marine, and pipeline safety. Established in 1967, the agency is mandated by Congress through the Independent Safety Board Act of 1974, to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)).

Recent publications are available in their entirety on the NTSB website. Other information about available publications also may be obtained from the website or by contacting—

National Transportation Safety Board
Records Management Division, CIO-40
490 L'Enfant Plaza, SW
Washington, DC 20594
(800) 877-6799 or (202) 314-6551