Submission to the
National Transportation Safety Board

for the
Investigation of the

Ravn Connect Flight 3153 Accident
Cessna 208B; N208SD
Togiak, Alaska; October 2, 2016

Federal Aviation Administration
Office of Accident Investigation and Prevention
Accident Investigation Division (AVP-100)

U.S. Department
of Transportation
**Federal Aviation
Administration**

800 Independence Ave., SW.,
Washington, DC 20591

Office of Accident Investigation & Prevention

February 23, 2017

Mr. Shaun Williams
Investigator-in-charge
National Transportation Safety Board
Office of Aviation Safety; Alaska Regional Office
222 West 7th Avenue Room 216, Box 11
Anchorage, Alaska 99513

RE: Submission for the *Ravn Connect Flight 3153* Accident Investigation

Dear Mr. Williams:

As requested during the NTSB Technical Review for the subject investigation, please find the attached submission for your review and distribution in accordance with NTSB procedures.

This submission was developed by AVP-100 with input from specialists in other FAA offices that have expertise with the issues addressed in the subject investigation. The findings contained in this submission are based on factual information from the NTSB public docket. These findings are presented in a concise and logical manner to best convey our views to NTSB staff and Board Members regarding issues that have arisen from this tragic accident.

We would like to thank the NTSB for giving AVP-100 the opportunity to make this submission. Should you have any questions or concerns related to this matter, please contact me at [redacted], or email at [redacted].

Sincerely,

[redacted]

Jeffrey B. Guzzetti
Director; Accident Investigation Division (AVP-100)

Attachment: Submission to NTSB for the *Ravn Connect Flight 3153* Investigation

Submission to the National Transportation Safety Board
for the investigation of
Case No. ANC17MA001; *Ravn Connect Flight 3153*;
October 2, 2016; Togiak, Alaska

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AVP-100 Submission

NTSB Aircraft Accident Investigation Case No. ANC17MA001
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INTRODUCTION

On October 2, 2016, about 1154 Alaska daylight time, a Cessna 208B Grand Caravan airplane, N208SD, was destroyed after impacting mountainous terrain about 12 miles northwest of Togiak, Alaska. The airplane was being operated as flight 3153 by Hageland Aviation Services, Inc., doing business as (dba) Ravn Connect, as a scheduled commuter flight under the provisions of 14 Code of Federal Regulations (CFR) Part 135 and visual flight rules (VFR). All three people on board (two commercial pilots and one passenger) were killed.

The investigation into the accident was led by the National Transportation Safety Board (NTSB). Senior air safety investigators from the Federal Aviation Administration's (FAA) Accident Investigation Division (AVP-100) participated in the investigation and supported NTSB's investigative interviews and activities. They were assisted by inspectors from the Anchorage Flight Standards District Office (FSDO) and the Polaris Certificate Management Office (CMO). Additionally, staff and managers from the FAA's Flight Standards Service (AFS) and Aircraft Certification Service (AIR) also assisted. The also FAA provided four witnesses and an agency spokesperson to support the NTSB Public Hearing held in Anchorage, Alaska on August 19, 2017.

The FAA appreciates the opportunity to provide this submission to the NTSB in accordance with 14 CFR § 831.14.[1]

THE ACCIDENT FLIGHT

History of Flight

The accident airplane was being operated as flight 3153 by Hageland Aviation Services, Inc., dba Ravn Connect, as a scheduled flight under the provisions of 14 CFR Part 135. Flight 3153 had originated in Bethel, Alaska, and made scheduled stops in Togiak and Quinhagak. It was scheduled to return to Togiak and then Quinhagak before returning to Bethel, the intended final destination for the day. The accident flight occurred on the third leg of the trip and had departed Quinhagak for Togiak about 1133. Two Hageland commercial-rated pilots and one passenger were on board. The flight took an almost direct route from Quinhagak to Togiak, which involved flying over or around higher terrain as shown in Figure 1 below.

The airplane was equipped with a satellite tracking device that reported the aircraft position, altitude, heading and groundspeed in 6-minute intervals. The last information was transmitted by the device about 4 minutes before the accident, as shown by the red track in Figure 1. At the time of this final transmission, the airplane's altitude was reported as about 1,000 feet above mean sea level (msl), while traveling at 144 knots groundspeed on a heading of 140 degrees. The airplane impacted mountainous, rocky terrain about 12 miles northwest of Togiak. The location of the

[1] 49 CFR § 831.14 states, in part: "Any … government agency…. whose employees, functions, activities… were involved in an accident … may submit to the Board written proposed findings to be drawn from the evidence produced during the course of the investigation… To be considered, these submissions must be received before the matter is calendared for consideration at a Board meeting."

initial impact site on the top of the ridge is about 200 feet below the estimated 2,500-foot peak (see Figures 2 and 3 below).[2] Witness marks on the vertical speed indicator showed a steep rate of climb.

Another Hageland flight had also departed Quinhagak for Togiak about 10 minutes after flight 3153 and chose a longer, more southern route which allowed it to remain over lower terrain. As depicted in Figure 1 below in the blue track, the second airplane was slightly west of the track of the accident flight and deviated around the mountain where the accident occurred.[3] Visual meteorological conditions (VMC) prevailed at the Togiak Airport, and company flight following procedures were in effect. However, as discussed later on page 4, the weather conditions at the accident site likely included cloud obscuration and low visibility.

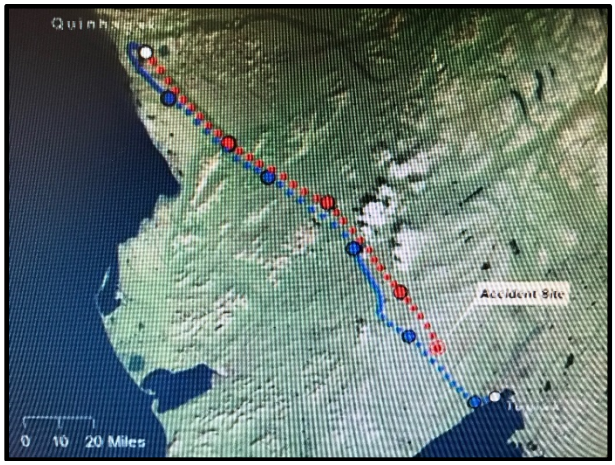

Figure 1: Flight tracks of accident aircraft (in red), and another company flight that departed about 5 minutes later (in blue) which took a more southern track over lower terrain.

Figure 2: View of the opposite side of the mountain that was impacted by the accident airplane. Initial impact is denoted by the top circle (opposite side).

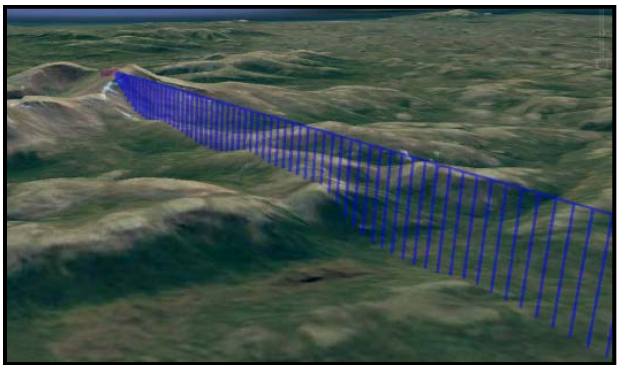

Figure 3: Flight track of accident airplane assuming direct line from last recorded spider track to impact site. (Source: Honeywell)

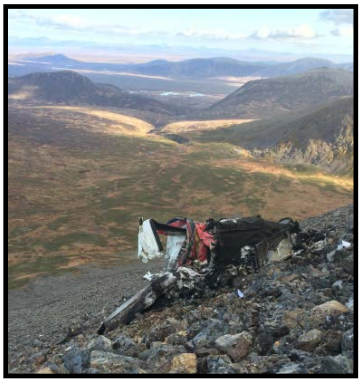

Figure 4: A portion of the airplane wreckage as found on the accident site.

[2] The source of Figures 2 and 4 is the NTSB's public docket. The source for Figure 3 is Honeywell's presentation at the NTSB Public Hearing.
[3] Source: NTSB Public Hearing presentation by the NTSB Investigator-in-charge.

Flight Crew Information

The accident flight crew consisted of two pilots, even though only one was required by aircraft type design.[4] The pilot-in-command (PIC) was 43 years old and resided in Montana. Hageland Aviation had employed him since November 2, 2015. According to company records, he had a total of 5,800 hours, including 4,000 hours in the Cessna 207 (C-207) aircraft, and 100 hours in the C-208B aircraft when hired by Hageland, which included 4,300 hours of Alaska PIC time. He was initially assigned as a PIC in the company's C-207 aircraft. In January 2016, the PIC completed the necessary training and checks to be assigned as PIC in the C-208B. Company records show he had flown the C-208B for a total of 98.2 hours in September 2016, and 95 hours in August 2016. He had completed his most recent proficiency check in the C-208B in July 2016. His training and checking records at Hageland and his previous employer (Yute Air) did not reveal any problems or concerns.[5]

The PIC had completed a line check, instrument proficiency check, and competency check about three months prior to the accident. He had also completed computer-based training for controlled flight into terrain (CFIT) avoidance, as well as simulator training for compliance with the Medallion Foundation CFIT avoidance program. An interview with a copilot who had flown with him the day before the accident did not reveal anything noteworthy in the pilot's behavior.

The second-in-command (SIC) was 29 years old. Hageland Aviation had employed him since July 18, 2016. Prior to being hired at Hageland, he was enrolled in a flight training program at the University of Alaska at Anchorage. He completed the required test and gained a commercial pilot certificate on May 4, 2016. The SIC reported that he had a total of 189 hours, including 139 hours PIC flight time at the time he was hired by Hageland. On September 3, 2016, he completed necessary training and checks at Hageland, and was assigned as SIC in the C-208B. Although he completed company CFIT avoidance computer-based training, no records were found that would indicate he completed CFIT simulator training.

Finding 1: The pilots were properly certificated and qualified in accordance with Federal regulations and company requirements.

Airplane Information

The accident aircraft was a Cessna 208B Grand Caravan, powered by a single Pratt and Whitney PT6A-114A turboprop engine. The airplane was manufactured in 1995 and its last airworthiness certificate was issued March 2, 2009.

At the beginning of the accident flight, the airplane had accumulated 20,562 hours total time, with a Hobbs/Tach (engine) time of 1,566 hours. The next maintenance/inspection was due at an

[4] Hageland elected to add a second pilot to some flights to allow the crew to be scheduled for up to 10 hours of flight time per day, as opposed to 8 hours for single-pilot operations. Whenever the company assigned an SIC, he or she was expected to act as a second crewmember. There was no separation of flight duties between a PIC and an SIC, such as pilot flying and pilot monitoring, specified in the General Operations Manual (GOM) or training program. When the second pilot was added to allow for extended flight time, that person became a required crewmember.

[5] The source of information for this section is mostly from the NTSB Operational Factors Group Chairman's Factual Report.

airplane total time of 20,600 hours. According to the flight log found at the accident site, the airplane was configured with two passenger seats, one behind each of the pilot seats.

The airplane was equipped with a Honeywell EGPWS (Enhanced Ground Proximity Warning System) Terrain Awareness Warning System (TAWS).[6] This system is discussed in more detail later in this submission. The airplane was also equipped with two GPS navigation systems. These systems could provide the pilot with route guidance between airports when ground-based navigational aids were not available for use.[7]

No evidence was found to indicate any pre-impact mechanical malfunctions with the engine or airframe. Calculations made using an estimated passenger weight of 200 lbs., and assuming no cargo on board, indicate that the airplane's weight and center-of-gravity were within operating limitations set by the airplane manufacturer.

Finding 2: The airplane had no preimpact anomalies that would have precluded its normal operation.

Weather Conditions During the Flight

Reported weather data around the time of the accident at the Togiak Airport indicated VFR conditions, as detailed as follows:

- At 1156, a meteorological report (METAR) from the Togiak Airport reported wind calm, visibility 7 statute miles, light rain, scattered clouds at 3,900 feet above ground level (agl), sky overcast at 4,700 feet agl, temperature 7 degrees C, dew point 6 degrees C, and altimeter setting 29.88 in. Hg. At a distance of 12 miles, this was the closest weather reporting facility to the accident site.
- The last METAR report of Togiak Airport weather the pilot had available to him prior to his 1133 departure from Quinhagak was time-stamped 1056, and reported the conditions at Togiak Airport as: wind calm, visibility 10 statute miles, sky overcast at 1600 feet agl, temperature 7 degrees C, dew point 6 degrees C, and altimeter setting 29.86 in. Hg.
- As the flight approached Togiak Airport, the airport weather at 1139 was reported as: wind calm, visibility 9 statute miles, light rain, scattered clouds at 1400 feet agl, sky overcast at 4400 feet agl, temperature 8 degrees C, dew point 6 degrees C, and altimeter setting 29.87 in. Hg. It is not known if the pilot received this report over the radio as he was approaching Togiak.

However, FAA weather camera images provided indications that the conditions near the accident site were not as favorable as those reported at the Togiak Airport. The weather cameras were located at the Togiak Airport and captured views of the terrain and sky at various angles looking out from the airport. The weather camera pointing west from the Togiak airport captured an image

[6] The terms EGPWS is a proprietary term belonging to Honeywell. The term TAWS is a generic term for any terrain warning and avoidance systems. They are often used interchangeably.

[7] This was the case over much of the region in which Hageland operated. On VFR flights like the accident flight, pilots would generally follow the direct route that the GPS navigation systems created, but would typically deviate from this route as required to avoid terrain and/or non-VFR weather conditions.

at 1156, about the time the accident occurred. In the photo, low clouds are partially obscuring the top of a 1300-foot mountain located 7 miles west of the airport. The weather camera pointing north from the Togiak airport captured an image at 1159 in which the top of a 400-foot mountain 3.5 mile from the airport was clearly visible but another 550-foot mountain 12 miles away was only faintly visible. The accident flight was arriving from the northwest and no weather camera captured images from that direction.

Finding 3: The accident flight encountered deteriorating weather conditions as it approached rising terrain, and the point of impact was likely obscured by overcast clouds and restricted visibility at the time of the accident.

On the day of the accident, the flight crew was scheduled to complete five legs under the flight number 3153.[8] Prior to the first leg, the PIC spoke with the Hageland Operational Control Agent (OCA) regarding all five legs of the planned flight. During this conversation, he recommended the flight be operated under instrument flight rules due to the en route weather in the area. However, the PIC disagreed because he believed that the weather conditions were sufficient for the flight to be operated under visual flight rules.[9]

For the accident flight, the OCA described the release procedure as normal. Per their FAA-approved Operations Specifications (Ops Specs), the approved weather source for Hageland is the U.S. National Weather Service (NWS). At the Hageland Operational Control Center (OCC), the OCA assigned to the flight stated he checked the NWS's Alaska Aviation Weather Unit website to view area forecast, METARs, TAFs, and the FAA weather cameras located at Quinhagak and Togiak airports. He then spoke with the accident PIC, and they agreed the weather was VFR at the departure and arrival airports, and the area forecast was good. There was some rain and clouds near Quinhagak Airport, which was the second airport that this flight would land at, and also the departure airport for the accident leg. The OCA had recommended that the flight proceed under an instrument flight rules (IFR) flight plan because of the rain he observed near Quinhagak, but he agreed with the PIC that the airport was in VFR conditions, and operating the flight under VFR would be legal according to company policy and FAA regulations.[10]

Finding 4: For unknown reasons, the pilot-in-command continued to fly in weather conditions that were below the required visual flight rule minimums, contrary to Federal Aviation Regulations.

[8] Hageland indicated that the practice at the carrier was to assign a single flight number and complete a single risk assessment for an airplane that may depart its base and make stops at several other airports before returning to the base. This practice was not contrary to any FAA regulations or Operations Specification requirements.

[9] The OCA considered the elements of risk for the flight, and together with the PIC, determined the risk assessment (RA) number for that flight. The RA number was determined by completing a form. After considering various potential hazards for the flight using this form, the PIC would arrive at an RA number between one and four. The PIC would then consult with the OCA for the flight, and verify that the OCA concurred with the RA number. An RA of one or two would allow the flight to proceed with only the approval of the PIC and the OCA. An RA of three would require the flight also be approved by a designated management official named in the GOM. An RA of four would delay or cancel the flight.

[10] NTSB Investigative Hearing; August 17, 2017. Exhibit 2A: Operational Factors Factual Report, page 28.

FAA OVERSIGHT

Previous Hageland Accidents and NTSB Recommendations

Over the past six years, Hageland (and other operators owned by Hageland's parent company at the time, HoTH, Inc.), experienced several fatal and non-fatal accidents, as summarized below:[11]

Date	Location	Flight Info	Aircraft	Operation	Injuries/Damage	Circumstances
Dec. 3, 2012	Mekoryuk	Era Alaska	Cessna 208B	Part 135 VFR sched.	1 minor injury Substantial	Engine Failure
May 4, 2013	Newtok	Era Alaska	Cessna 207	Part 135 VFR sched.	4 minor injuries Substantial	**CFIT** (Flat Light)
Oct. 23, 2013	Homer	Era Alaska	Beech 1900	Part 121	No injuries Substantial	Gear retracted during landing
Nov. 22, 2013	Deadhorse	Era Alaska	Beech 1900	Part 135 VFR on-dem	No Damage Substantial	**CFIT** (Landed short)
Nov. 29, 2013	St. Mary's	Era Alaska	Cessna 208	Part 135 VFR sched.	4 fatal, 3 serious Substantial	**CFIT** (During approach)
April 8, 2014	Kwethluk	Ravn Connect	Cessna 208B	Part 91 VFR training flight	2 fatalities Destroyed	Check airman's delayed action
May 1, 2014	NTSB Issues Safety Recommendations A-14-22 and -23 Regarding Audits of HoTH					
Aug. 31, 2016	Russian Mission	Ravn Connect	Cessna 208B	Part 135 VFR sched.	3 fatalities Substantial	Midair Collision
Oct. 2, 2016	Togiak	Ravn Connect	Cessna 208B	Part 135 VFR sched.	3 fatalities Destroyed	**CFIT**

Prompted in part by the first six accidents listed above, the NTSB issued two safety recommendations to the FAA on May 1, 2014. A summary of these recommendations and their status is provided as follows:

- **Safety Recommendation A-14-22** requested that the FAA conduct an audit of regulatory compliance and safety programs in place at Hageland, using personnel from outside the Alaska region to conduct the audit. ***Status:*** The FAA conducted this audit between April 28 and May 9, 2014. In response to the audit, Hageland implemented six changes to their operation, the most significant of which was the creation of its OCC. The implementation of the OCC had significantly reduced the number of persons having operational control from 80 flight coordinators to seven plus a manager. Because of the FAA's completion of the audit of Hageland and the other HoTH Inc. carriers, and the implementation of satisfactory corrective action on the part of the carriers for all adverse audit findings, the NTSB classified the recommendation as *"Closed-Acceptable Action"* on October 18, 2016.

- S**afety Recommendation A-14-23** requested that the FAA conduct an audit of FAA oversight of HoTH Inc. operators, including Hageland Aviation. The NTSB stated that the audit should be conducted by FAA personnel from outside the Alaska region, and address inspector qualifications, turnover, working relationships between the FAA and the operators, and

[11] Source: NTSB aviation accident database.

inspector workload to determine whether staffing is sufficient. Status: An audit was conducted by the FAA in June of 2015. They reported no adverse findings, and the NTSB classified this recommendation as *"Closed-Acceptable Action"* on October 18, 2016.

An additional NTSB recommendation were referenced during the Public Hearing in Anchorage for this investigation by one of the members of the Board of Inquiry, Mr. John Delisi, as follows:

- **Safety Recommendation A-16-34.** Mr. Delisi referenced an NTSB recommendation issued in 2016 to require all Part 135 operators to install flight data recording devices capable of supporting a flight data monitoring program. The recommendation was adopted in a report concerning a business jet that crashed during approach near Akron, Ohio.[12] Mr. Delisi asserted, "the FAA's initial response was a big fat 'no'."[13] ***Status***: The FAA's initial response to this recommendation was that it would "conduct a review to determine the feasibility" for rulemaking in order to address the recommendation.[14] The Safety Board voted to classify this FAA response as "*Open – Acceptable.*" Since then, FAA has made additional progress in attempting to meet this recommendation.

Finding 5: The FAA responses to recent NTSB recommendations related to Hageland Aviation operations and Part 135 flight data monitoring programs have been classified by the Safety Board as acceptable.

The Polaris Certificate Management Office Oversight of Hageland

Following the Hageland/HoTH accidents, the FAA Flight Standards Service initiated a significant action to create a dedicated Certificate Management Office, or CMO. This new CMO was named the Polaris CMO and became effective in 2014. The Polaris CMO houses the Certificate Management Team (CMT) for Hageland, which consists of five aviation safety inspectors dedicated solely to the oversight of Hageland. Of the five inspections, two are operations inspectors, two are maintenance inspectors, and one is an avionics inspector. These five inspectors continue to maintain almost daily interactions with Hageland officials.

Following the St. Mary's accident in 2013, the FAA ensured that that Hageland implemented numerous changes, and it continues to ensure those changes have taken hold.

Following the Togiak accident, and in addition to the required and robust surveillance already being provided by the FAA, the CMT took additional action in order to validate that FAA is following its processes and examining the appropriate areas of Hageland's operations. The actions performed by the CMT for this effort included the following:

[12] NTSB Accident Report No. AAR-16-03. Crash During Nonprecision Instrument Approach to Landing Execuflight Flight 1526. On November 10, 2015, about 1453 eastern standard time, Execuflight flight 1526, a British Aerospace HS 125-700A (Hawker 700A), N237WR, departed controlled flight while on a nonprecision localizer approach to runway 25 at Akron Fulton International Airport (AKR) and impacted a four-unit apartment building in Akron, Ohio. The captain, first officer, and seven passengers died; no one on the ground was injured. The airplane was destroyed by impact forces and postcrash fire. The airplane was registered to Rais Group International NC LLC and operated by Execuflight under Part 135 as an on-demand charter flight.
[13] NTSB Public Hearing transcript.
[14] The FAA's initial response can be found on the NTSB's web site in the "Recommendations" section.

- Reevaluated the carrier's level of risk as per FAA business processes
- Validated that FAA inspectors were following proper documentation procedures for surveillance to capture all the risks via the agency's new Safety Assurance System (SAS)
- Conducted an internal assessment of Hageland's system designs for high-risk
- Initiated an external audit by inspectors from outside Alaska to assess the performance of Hageland against that system

During a 6-month period in 2016, the FAA conducted 117 inspections on Hageland, equating to an average of one inspection every business day. The few findings discovered during those inspections were immediately resolved by Hageland. Additionally, during the two-year period of 2015 through 2016, the CMO sent over 100 formal letters to Hageland, most via certified return receipt, that clearly indicate frequent and consistent communication and oversight.[15] The issues addressed in these letters covered a wide variety of safety oversight topics such as: letters of investigation for en route inspection and maintenance findings; revisions to the GOM and training manuals; dispositions on key Part 119 personnel; changes to operations specifications; and corrections to manuals.

Hageland also entered into a commitment with the FAA after the Togiak accident to accomplish the following:

- Voluntarily implement Safety Management Systems (SMS) into their operation
- Implement a Professional Pilot Program by bringing in outside consultants to provide training in new hire and recurrent ground school
- Convert the entire manual system to an electronic format
- Install Flight Operations Quality Assurance (FOQA) data recording equipment on all of their aircraft to monitor flight parameters for every flight to improve operational control
- Develop a department that analyzes FOQA data to ensure compliance with manual requirements
- Elevate the risk of an Inoperative GPS – requiring specific management approval to fly
- Modify their Cessna 208 checklist to verify that the TAWS is selected "on" prior to every flight
- Conduct all VFR flights on a GPS route with minimum altitudes, visibility and ceiling assigned for day/night operations
- Utilize direct routing and GPS navigation on most routes
- Enter route parameters into the management software system for an authorized flight release.

[15] This content of this correspondence was referenced in the FAA surveillance tracking system records provided to the NTSB upon their request for this investigation. Copies of the actual letters are also available upon request.

During the NTSB public hearing, the FAA Principal Operations Inspector (POI) stated: "As far as the oversight goes, we spend a lot of time with those guys anyway. We're a normal picture … on their scene…. It's been like that since September of 2014 since I've been on the certificate."[16]

Additionally, when the Hageland Chief Pilot was asked about how Hageland had changed since the time she had left them in 2011 as compared to when she returned to the airline in 2015, she said:[17]

> "It was very different to our model now. There were a lot of pressures, self-induced, and by the way our system was set up, that were placed on the pilot. So when I came back in 2015, it was unbelievable to me how far the company had come in such a short period of time. And having an Operational Control Center completely removed from all of our revenue greatly increased safety and removed so many pressures that I had come to accept as normal as a line pilot when I flew the line back in 2009 through 2011. …that OCC has been a big part of that culture shift."

Finding 6: Since the creation of the Polaris CMO in 2014, FAA oversight of Hageland has been aggressive, robust, and effective.

FAA Enforcement Authority and Compliance Philosophy

On June 6, 2015, about 18 months prior to the accident, FAA published FAA Order 8000.373, *Compliance Philosophy*. On September 8, 2015, about one year prior to the accident, the FAA issued Notice 8900.323, *Flight Standards Service Compliance Policy*. Additionally, the primary guidance document utilized by FAA inspectors – FAA Order 8900.1[18] – was revised to reflect these two policy documents, and also to reflect related changes to FAA Order 2150.3, *FAA Compliance and Enforcement Program*.

In summary, the compliance philosophy stresses that the responsibility for aviation safety does not rest entirely with the FAA and that each individual certificate holder's duty and responsibility is to provide for public safety. The high level of safety in the National Airspace System (NAS) is largely based on, and dependent upon, voluntary compliance with regulatory standards. The success of FAA voluntary programs has demonstrated that a collaborative compliance philosophy, supported by a positive safety culture, provides the highest levels of compliance with regulations, the most effective identification of hazards, and the most efficient management of risks.

Regulatory and procedural disobedience – such as continuing VFR flight into IFR conditions -- is difficult to uncover during FAA inspections because those being observed are typically on their best behavior. Moreover, if potential violations of FAA regulations are discovered, clear evidence of those violations must be presented and vetted to justify civil penalties or certificate action. The FAA has the burden of proof, by a preponderance of the reliable, probative, and substantial evidence, to establish all facts necessary to satisfy each element of a statutory or regulatory violation.[19]

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[16] NTSB Public Hearing transcript.
[17] NTSB Public Hearing transcript.
[18] Flight Standards Information Management System (FSIMS) Volume 14 - Compliance and Enforcement - Chapter 1: Flight Standards Service Compliance Policy - Section 1, 14-1-1-1 General.
[19] The preponderance of evidence standard requires that the FAA's evidence show that it is more likely than not the respondent committed the violation.

THE MEDALLION FOUNDATION

Overview and FAA Relationship

At the time of the accident, Hageland was a participant in the Medallion Foundation, which is a non-profit organization that promotes aviation safety through systems enhancements by providing management resources, training, and support to the aviation community. In an effort to address aircraft accidents and fatalities in Alaska, the Alaska Air Carriers Association, with the support of Congress, created the Medallion Foundation in 2001 to supplement the FAA's certification and oversight efforts to improve air safety in Alaska. Medallion's mission is to reduce aviation accidents by fostering a proactive safety culture and promoting higher safety standards through one-on-one mentoring, research, education, training, auditing and advocacy. The Medallion Foundation fees are minimal compared to other well-known safety organizations. The operators who benefit the most from Medallion programs are small operators with limited resources.

In 2002, the Medallion Foundation signed a grant agreement with the FAA to launch a major statewide aviation safety program to establish safety standards that exceed regulatory requirements through the detection of safety trends or needs before the actual accidents occur. The Medallion Foundation Shield Program was created to develop and maintain a higher level of safety through the use of system safety and safety management principles.

A portion of Medallion Foundation funding is currently provided by the FAA via a contract with the FAA called an "Other Transactional Agreement" (OTA). This funding supplies about 45% of Medallion's operating budget. FAA uses this agreement as a means of influencing safety change over and above the requirements that can be enforced through regulatory means. The provisions of the contract also call for semi-annual audits to be conducted by the FAA. The OTA sets forth the relationship between the FAA and Medallion, as contained the Medallion program objectives. FAA auditors develop questions around these program objectives. The audits examine the Medallion policy and procedures manual they were required to follow, in addition to the OTA, to make sure Medallion was following the manual's guidance. The FAA audits indicate whether Medallion is meeting the requirements or not, and the results are then conveyed to Medallion.

Medallion is not an enforcement body or agency, nor are they a reporting conduit to the FAA. The Medallion Foundation is not part of the FAA, and an air carrier's membership to the foundation is voluntary. The Medallion Foundation was designed to actively oversee a member carrier's operations. Ultimately, member carriers of Medallion must take responsibility for implementing the programs that Medallion helped develop and adopt.

As part of his confirmation hearing process last year to become the NTSB Chairman, then-Member Robert Sumwalt provided this statement in his response to a question for the record regarding the Medallion Foundation:[20]

> "I am familiar with the Medallion Foundation and appreciate the work they have done to improve safety in Alaska. I believe in order for the Medallion Foundation to be effective, a partnership with the regulator (FAA) is essential. As the regulator, the FAA has the ability to encourage such programs, and in my opinion, programs such as the Medallion Foundation should be part of the FAA's "safety tool box."

[20] Questions for the Record posed by Senator Dan Sullivan; Senate Commerce Committee on Commerce, Science, and Transportation; Nominations Hearing, June 8, 2017.

The FAA concurs with this statement. However, two months later during the NTSB public hearing for the Togiak investigation, the NTSB conveyed skepticism of Medallion's efforts and motivations. The questioning of Medallion by the NTSB staff at the public hearing, their selection of interviewees during the investigation, and specific items placed in the hearing's public docket indicated a concern by NTSB that Medallion only provides the "illusion of safety." The FAA does not share this view, based on the agency's history with Medallion, and also based on the measurable improvements that the foundation has made with aviation in Alaska as discussed in the next section.

However, the FAA also recognizes that improvements can be made, and have been made, to the Medallion Foundation's processes based the findings from aviation accidents that have occurred in Alaska involving Medallion members, As previously stated, the FAA's relationship with the Medallion Foundation is delineated in the OTA, which gives the FAA the authority to provide funding, revise its semiannual audits, direct resources to areas where the FAA desires to influence safety, and ensure that Medallion's stipulated requirements are being met.

Impact on Aviation Safety in Alaska

In response to a query by the NTSB investigator-in-charge (IIC) during the public hearing for this investigation, the FAA conducted a data study to assess the effectiveness of the Medallion Foundation on aviation safety in Alaska.[21] This study analyzed two sets of objective, independent data external to the Medallion Foundation.[22] Differing periods were used as the data sets can be evaluated independently. The study was completed and sent to the NTSB following the public hearing. Excerpts are provided below. The study compares the two data sets for operators who were, as of September 1, 2017, members of the Medallion Foundation, and those who were not.

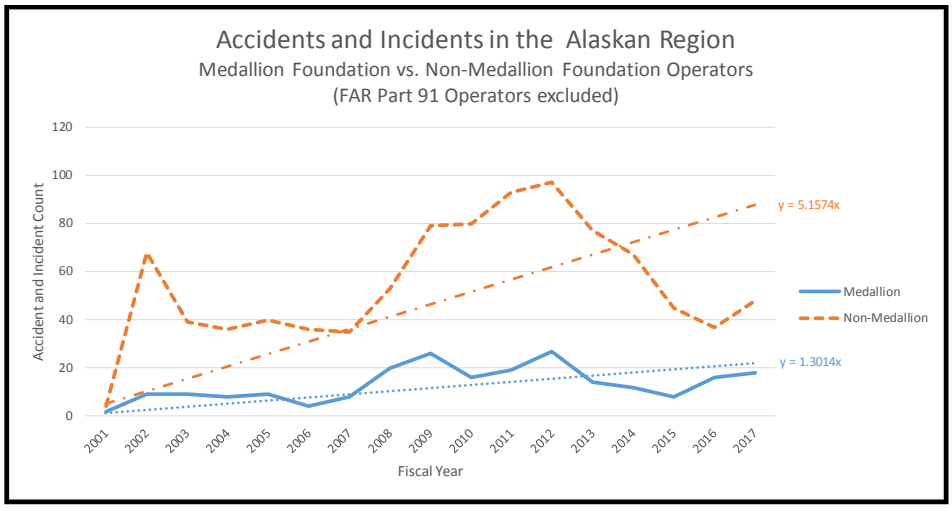
Data set no. 1 - Accidents, Incidents, and Occurrences: The first set of data was collected via a locally maintained FAA database that contains NTSB data along with localized incident, occurrence and other information collected by the FAA. The FAA assumes that this data provides a measure of demonstrated risk. The data collected and examined for this study dates back to 2001, which is when the Medallion Foundation was formed. The study compared this set of data for Medallion and Non-Medallion Foundation Operators. The air carriers that were selected for this study include all Part 135 and Part 121 commercial air carriers who have been operating in Alaska since October 2001. The breakdown of the complete data set is as follows:

Type	Count	Percentage of Total
Occurrence	788	52%
Incident	266	18%
Accident	463	31%
Total	1517	

[21] During the public hearing, the NTSB IIC, Mr. Shaun Williams, asked the Manager of the FAA's Alaska Region Flight Standards Manager – Mr. Clint Wease -- if he could "explain … what specifically measurable performance outcome data the FAA has collected from Medallion over the past 15 years." In response, Mr. Wease indicated that he was not sure if the FAA collected that type of specific data, but he committed to determine what data was available to answer the intent of the question. Mr. Wease later stated during the hearing that he would review data similar to data used for the FAA's Air Carrier Risk Assessment Tool in an attempt to "compare risk of peer groups of like carriers" and assess the safety performance of Medallion carriers versus non-Medallion carriers.

[22] The study was conducted by the Flight Standards Safety Analysis and Promotion Division, Safety Analysis Branch (AFS-930).

The analysis of the data indicate an increasing trend of the total number of all three report types among both Medallion and Non-Medallion commercial operators in the Alaskan Region since 2001.[23] One of the data runs that were plotted, shown below, was performed with only the accidents and incidents, because "occurrences" do not all necessarily relate to a safety risk.[24] This analysis indicates a data trend of a *lower rate of increase* of accidents and incident reports for Medallion Operators versus Non-Medallion Operators.[25]



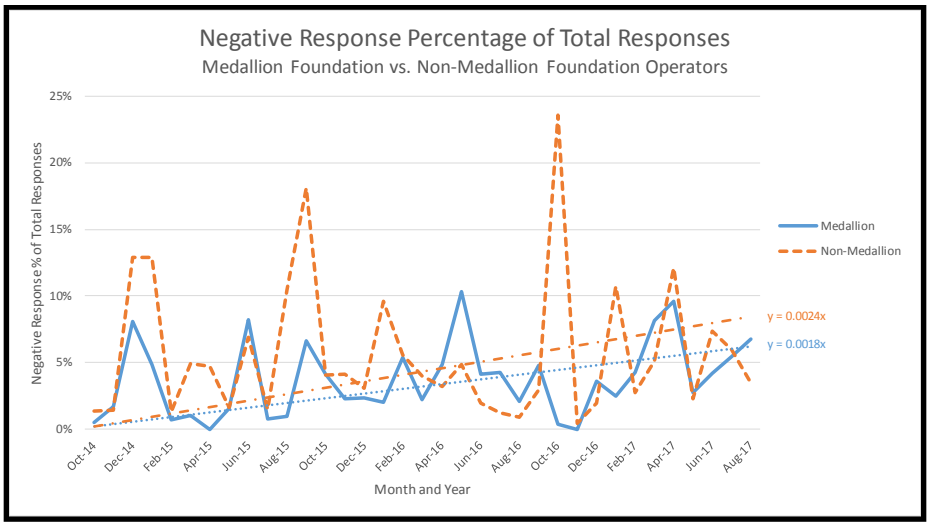
Data Set no. 2 - Safety Assurance System (SAS) Surveillance Data: The second set of data that was analyzed is surveillance data from a system that has been in use by the FAA since late 2014 known as the Safety Assurance System (SAS). The study compared SAS data for Medallion and Non-Medallion commercial air carriers who have been operating in Alaska since October 2014. SAS includes Data Collection Tools (DCTs) which are utilized to collect FAA surveillance data in SAS. The DCTs consist of questions that are answered by FAA inspectors. The questions provide queries for specific aspects of an air carrier, and the inspectors provide answers such as "yes", "no", "not applicable", and "not observed". Based on the answers, the SAS programming determines whether the answer is a "positive" or "negative" response with regard to safety.

The SAS data was analyzed by conducting a trend analysis on time-phased positive and negative responses to all available DCT questions in the SAS database. The key words used to query the DCT responses from the Alaska air carriers were chosen because of their relationship with similar key words and concepts cited as goals and objectives that the Medallion Foundation agreed to accomplish for the FAA.

One of the plots used a query for key words that relate to concepts cited as goals and objectives that the Medallion Foundation. These key words were: *CFIT; Hazard; Risk; SMS; Operational Control; Flight Risk Assessment; Maintenance Ground Service; Safety Program; Internal Evaluation Program;* and *Internal Audit.* The negative responses as a percentage of total responses to all available DCT questions in the SAS database – from October 2014 through August 2017 -- were

[23] This study did not attempt to discern the reasons for the overall increasing trend, nor the contribution of each of the three types reports on the trend.
[24] The FAA definition of an "occurrence" is: "an event that is not readily discernible as an incident. Events such as a low speed abort or turn backs are considered occurrences and must be investigated to determine the impact on safety of operations."
[25] Again, the trend lines depicted were set to zero for both groups.

plotted for both Medallion and Non-Medallion operators in Alaska. The plot, shown below, indicates a generally increasing trend among both groups; however, since the introduction of SAS, negative responses as a percentage of total responses show *a lower rate of increase for* Medallion Operators versus Non-Medallion Operators (blue linear trend line is lower than orange). Additionally, the Medallion members appear much more consistent than the Non-Medallion Operators.[26]



Finding 7: When taken in the aggregate, surveillance data for air carriers who are Medallion Foundation members indicate that they have a higher safety performance (i.e. lower risk indications) than those air carriers who are not members of Medallion.

While working with the FAA, air carriers and other safety organizations, Medallion initiated numerous efforts to address issues revealed by accidents since 2014, such as the following:

- **Commuter Summit:** Hosted the first annual "Commuter Summit" to address Western Alaska commercial aviation safety issues and CFIT accidents.
- **Full-Motion Flight Simulator:** Ordered a new full-motion flight simulator to provide CRM training for Alaskan air carriers. In partnership with Alaska Airlines, courseware is being developed for smaller air carriers for use in building their own CFIT training programs.
- **Safety Video:** Worked with FAA, NTSB, and others to develop a safety video addressing CFIT concerns. Video presented at many safety events around the State (www.bit.ly/CFIT).
- **CFIT Star Revisions:** Formed a committee of program managers, auditors, Medallion Board Members, air carriers and FAA to address CFIT Star management after an accident.
- **Training Video:** Developed a training video to address how to set up scenarios for Flat Light, Deteriorating Weather, and White Out conditions.

[26] Again, the trend lines depicted were set to zero for both groups.

Medallion CFIT Training

Medallion created an aviation safety program to address the repeated patterns of CFIT accidents in Alaska. The CFIT avoidance (CFIT-A) program is designed to provide a framework to build an effective training program for all pilots. It is a combination of classroom training blended with a free Aircraft Training Device (ATD) or Flight Simulator scenario-based curriculum that focuses on the recognition, avoidance and operational aspects of flying in areas of flat-light, white-out, and deteriorating weather conditions. These ATDs and simulators permit pilots to safely practice maneuvers that are not possible in the aircraft.

The FAA does not require CFIT avoidance training for 14 CFR Part 135 certificate holders. However, as a member of the Medallion Foundation, Hageland Aviation was encouraged to implement CFIT avoidance training for its members. The investigation revealed that Hageland had constructed a CFIT-A Manual which contained a training program for Hageland pilots. The training, which was given during a pilot's initial and annual recurrent training, consisted of ground and simulator events. The training was outlined in the Hageland Aviation CFIT-A Manual. The ground training provides definitions, background, procedures and strategies for dealing with potential CFIT scenarios. The simulator training allows pilots to practice these procedures by recognizing and responding to these potential CFIT scenarios. The investigation revealed that Hageland had chosen to incorporate only the Medallion CFIT-A *ground training* element into their Operation Training Manual (OTM). While the CFIT-A ground training was not required by the FAA, the FAA approved the training via its approval of the OTM. The CFIT-A *simulator training* element was *not* included in the OTM, and was thus not approved by the FAA.[27]

During the NTSB public hearing, the manager of the Polaris CMO testified that the FAA only recognized the training manual used by Hageland Aviation's that was FAA-accepted. He stated:

> "… an FAA accepted manual, that is where we would look. That's what we would do the inspections and the audits against. We would not go and look at what Medallion had. Ideally, we would simply have everything … in just the FAA accepted documents and stop right there. And then if Medallion wanted to audit against that, that would be up to them ….. But for us, we do not touch, look at, deal with in any shape or form the Medallion manuals….because they're not FAA approved or accepted."[28]

The NTSB investigation revealed that Hageland Aviation did not ensure all pilots received all CFIT-A training prior to being assigned a revenue fight or flight duties, in accordance with Medallion's standards. The most recent audit of Hageland by Medallion of the CFIT-A training records prior to the Togiak accident did not identify training lapses in CFIT-A Training. In response, Medallion stated that their audits are typically spot checks, and if an audit had identified a finding, they would require a corrective action, such as developing a process to ensure no pilot is released to conduct a flight until all training is completed.

Finding 8: The incorporation of all elements of the Medallion CFIT-A program into an air carrier's FAA-approved training manual is voluntary and maximizes the program's effectiveness.

[27] For C-208B pilots at Hageland, the CFIT-A simulator training was conducted in the C-208B simulator at the University of Alaska at Anchorage.

[28] NTSB Public Hearing transcript.

TERRAIN AWARENESS WARNING SYSTEMS

The accident airplane was equipped with a Terrain Awareness Warning System (TAWS) in accordance with 14 CFR Part 135.154 (a)(2), which states:

> No person may operate a turbine-powered airplane configured with 6 to 9 passenger seats, excluding any pilot seat, unless that airplane is equipped with an approved terrain awareness and warning system that meets as a minimum the requirements for Class B equipment in Technical Standard Order (TSO)-C151.

Specifically, the accident airplane was equipped with a Honeywell KGP-560 TAWS unit configured for Class B TAWS. The installed unit had no terrain display and no radar altimeter connection. It used an internal GPS receiver and terrain database to determine if the airplane was in a position where conflicts with terrain or obstacles are a possibility. If the system determined a conflict could occur, it will provide various levels of alerts (cautions and warnings) to the pilot. Through a "look-ahead" feature, the system looks at the predicted flight path of the airplane for the next minute, and alerts the pilot if it determined the flight would come into conflict with terrain or obstacles. These alerts are aural and visual. The visual alert is the illumination of either a red (warning) or yellow (caution) "TERR" light on the unit's control panel.

Because of Alaska's limited infrastructure, variable weather, and terrain features, air carriers in Alaska typically fly as low as 500 feet above terrain, which is the minimum altitude permitted per FAA rules. The TAWS-B is designed to alert at altitudes beginning at 700 feet. For the en route phase of flight, this system would provide aural and visual cautions and warnings if the pilot descended below 700 feet agl and was not within 5 miles of an airport.

The EGPWS unit was recovered from the accident airplane, but was damaged such that the flight history data could not be retrieved from internal memory. However, Honeywell provided two simulations of the accident flight by estimating a flight path profile assembled from the provided Spidertracks data as well as the impact location. According to the Honeywell simulations:

- A "Caution Terrain" warning would have been given 46 seconds prior to impact.
- A "Terrain, Terrain, Pull Up" warning would have started 36 seconds before impact and continued until impact.

Additionally, based on the Spidertracks data, the aircraft appears to have flown at 1,000 feel msl for most of the flight, resulting in a terrain clearance between 500 and 700 feet for most of the flight. Therefore, Honeywell concluded that continuous EGPWS "Pull Up" warnings would have been given for most of the flight until the aircraft began to climb to 2,300 feet toward the end, assuming that the system was not "inhibited" by the pilot.

Inhibit Switch

The aural and visual terrain warnings and cautions that the KGP-560 EGPWS produced may be inhibited. A latching push-button on the control panel will inhibit these alerts when pushed in. The warnings will remain inhibited until the pilot pushed the button again and it moved out to the un-inhibited position. When the system's warnings and cautions are inhibited, a noticeable white light next to the button illuminated the message "TERR INHB." This is to inform the pilot that terrain

warnings and cautions will not be provided.[29] The primary purpose of the inhibit switch is to allow landing at airports that are not in the database. The switch can also be used to prevent nuisance alerts in VFR conditions while flying over unique terrain features.

A post-accident examination of the inhibit switch on the control unit found the switch to be in the out, or not-inhibited position. Despite multiple and comprehensive attempts to determine the pre-impact switch position, the investigation could not determine if the as-found position (not inhibited) was the actual position prior to impact.

Nuisance Alerts and Efforts to Mitigate Them

Honeywell testified at the public hearing that because of the low-level VFR flight operations of between 500 and 700 feet above ground along this route, and due to the continuous "Pull Up" alerts, the current FAA rules requiring Class B TAWS for the aircraft type involved in this accident "do not support the type of operations conducted in Alaska."[30] Testimony by Hageland pilots at the NTSB public hearing also supported this view. For example, the Hageland Chief pilot testified that during the non-accident flight from Quinhagak to Togiak on the day of the accident, the pilot "received either a caution or a warning … multiple times where she was at a legal altitude, between 500 agl and 700 agl."

The NTSB addressed the issue of TAWS nuisance alerts last year as part of its final report of an investigation involving a fatal air tour accident in Ketchikan, Alaska.[31] As a result of the investigation, the NTSB issued recommendation A-17-35 to the FAA to:

> "Implement ways to provide effective terrain awareness and warning system (TAWS) protections while mitigating nuisance alerts for single-engine airplanes operated under 14 Code of Federal Regulations Part 135 that frequently operate at altitudes below their respective TAWS class design alerting threshold."

In its initial response letter to recommendation A-17-35, dated July 21, 2017, the FAA stated that it "… would review this issue and determine its next steps", and that "… the General Aviation Joint Steering Committee (GAJSC) has approved and assembled membership for a working group aimed at examining CFIT accidents, to include part 135 operations." On October 26, 2017, the NTSB classified the FAA response as *"Open-Acceptable."* Since that response, the GAJSC CFIT Working Group has met several times and is actively working to draft proposed safety enhancements to mitigate TAWS nuisance alerts.

Additionally, in May 2017, the RTCA published DO-367, which modifies the Minimum Operational Performance Standards (MOPS) for TAWS. Specifically, DO-367 modifies the Forward Looking Terrain Avoidance (FLTA) enroute altitude alerting requirements from 700 feet to 500 feet. As a result, the Technical Standard Order for TAWS, TSO-C151d, incorporates the

[29] During the NTSB public hearing, the Hageland chief pilot testified that the indicator light that illuminates when the TAWS unit is inhibited is "… a really bright white light … very, very difficult to ignore."
[30] NTSB public hearing transcript.
[31] NTSB, *Collision with Terrain, Promech Air, Inc., de Havilland DHC-3, N270PA, Ketchikan, Alaska, June 25, 2015*, NTSB/AAR-17/02 (Washington, DC: NSTB, 2017).

new DO-357 standard and was published on August 31, 2017.[32] This means that *new models* of TAWS manufactured on or after August 31, 2017 must alert at 500 feet instead of 700 feet, resulting in a mitigation of unwanted FLTA altitude alerts while maintaining effective TAWS protections. The required FLTA enroute altitude for new TAWS units is now coincident with 14 CFR Part 135.203 minimum VFR altitude of 500 feet.

Honeywell also testified that it has developed a ***TAWS-C*** for General Aviation airplanes which meets TSO C-151 and has an alerting threshold of 250 feet agl (vice 700 feet for TAWS-B). According to Honeywell, the TAWS-C capability can be readily uploaded in the KGP-560 EGPWS by a maintenance technician by attaching the unit to a computer and uploading a free software update, designated as the "-005 patch". However, upgrading to the TAWS-C capability in the KGP-560 units that are currently installed in turbine-powered airplanes (configured with 6 to 9 passenger seats) is not permitted as per 14 CFR Part 135.154 (a)(2) which states that the TAWS unit must meet the "minimum the requirements for ***Class B*** equipment in …TSO-C151." The FAA has authority to grant an "exemption" to the Part 135.154 rule on a case-by-case basis, if an exemption were to be requested by an air carrier. If an air carrier were to request an exemption, the FAA would carefully review the justification provided, assess potential risks and unintended consequences associated with implementing such an exemption, and then decide whether to grant the exemption for that specific air carrier. To date, no air carrier has requested such an exemption.

Finding 9: Terrain Awareness Warning Systems provide enhanced safety for commercial aviation operations in Alaska, and the FAA is constantly evaluating design requirements and operations for potential improvements.

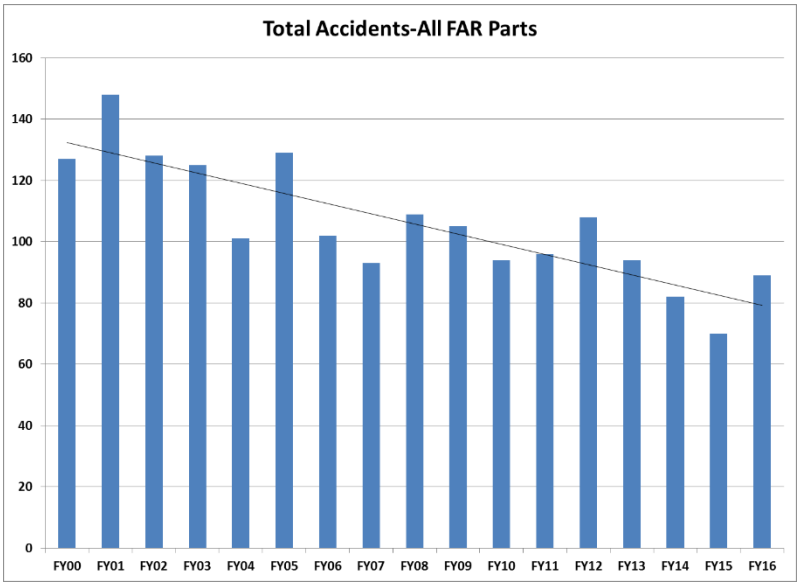
[32] It is TSO-C151d**,** titled *"Terrain Awareness and Warning System"* dated August 31, 2017. This previous version was TSO C151c on June 27, 2012.[32] TSO-C151c will remain effective until February 28, 2019. After that date, the FAA will no longer accept applications for TSO-151c.

AVIATION SAFETY IN ALASKA

The FAA recognizes that the any aviation accident is one too many, and that the state of Alaska's rate of CFIT accidents is higher than any other state in the United States. However, as shown in the graphic below, there has been an overall reduction of the total number of accidents in Alaska since 2000.

Total Aviation Accidents in Alaska

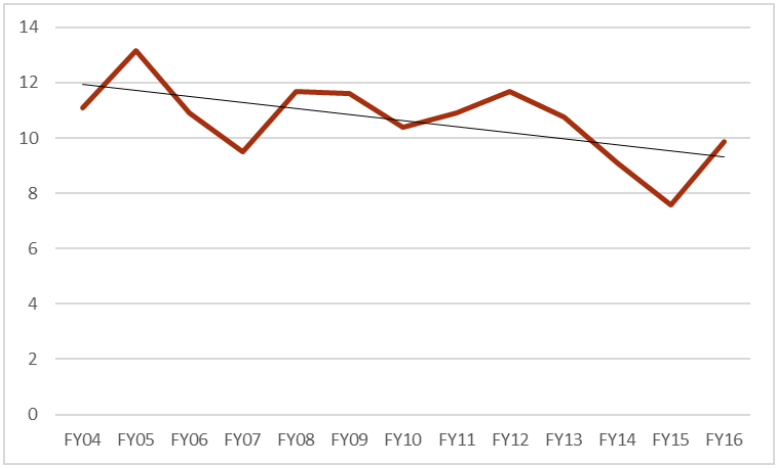
(Includes all Fatal and Non-fatal Accidents - in All FAR Types of Operations)



Even more remarkable, the overall *rate* of accidents in Alaska is on the decline, as shown in the next plot below. This rate is calculated with the use of data from the FAA's annual Air Carrier and GA Survey, which calculates the total number of flight hours flown each year in Alaska, and strives for 100 percent sampling of *all* pilots and operators in Alaska.

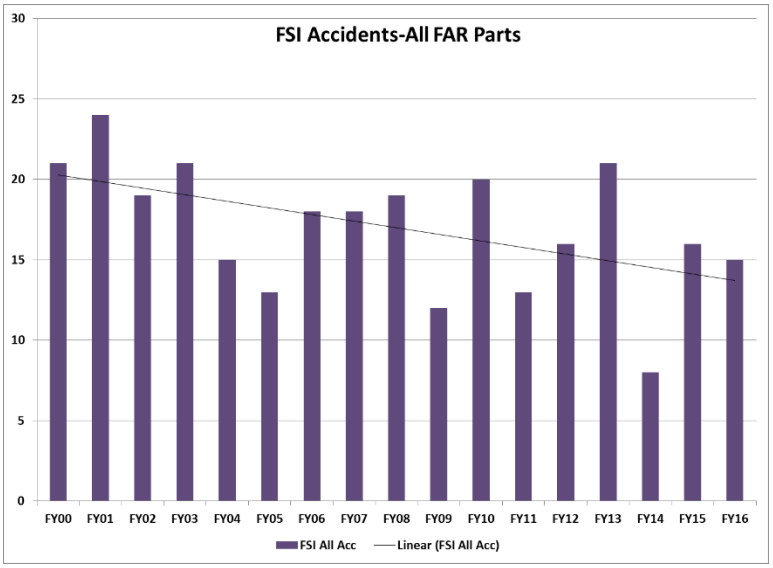
Aviation Accident *Rate* in Alaska

(Includes all Fatal and Non-fatal Accidents - in All FAR Types of Operations)



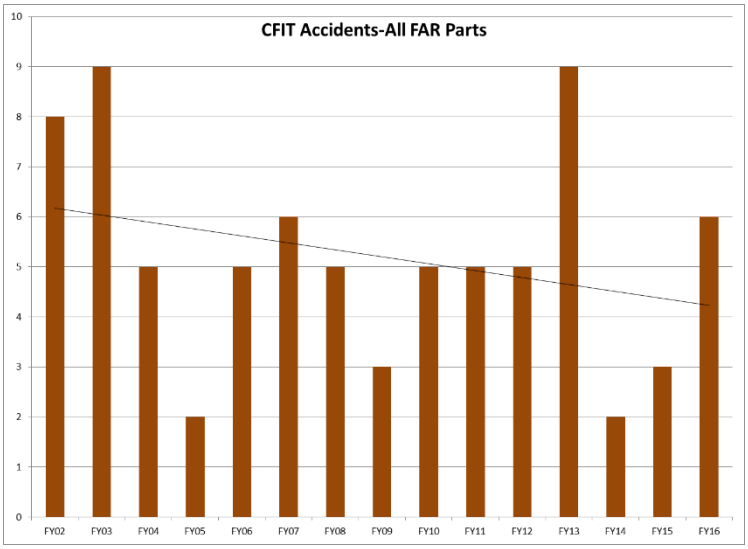
Since 2000, the trend of fatal and serious injury accidents in Alaska, or "FSIs", has also been decreasing, as depicted in the plot below. Note that FY14 had the lowest number of FSI's – eight -- since FAA began keeping records of this metric.

Total *Fatal & Serious Injury* Alaska Accidents
(Includes All FAR Types of Operations)



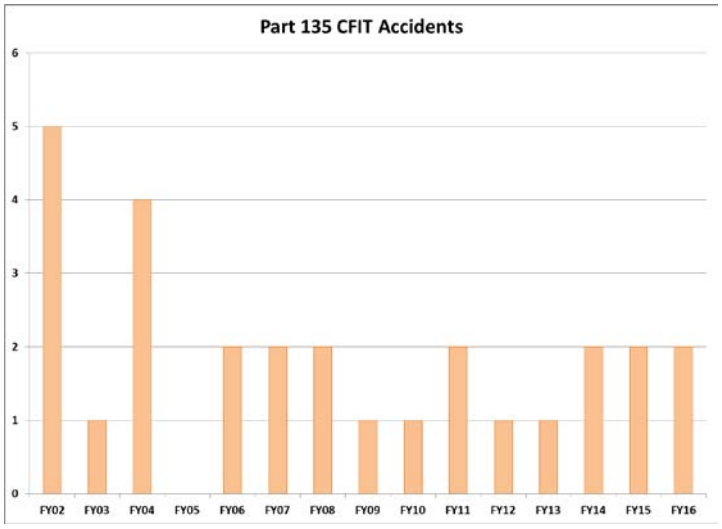
The next plot below illustrates the downward trend in the total number of <u>*all CFIT accidents*</u> in Alaska, both commercial and private operations since FY02. While there was a momentary increase in CFIT accidents from 2014-2016, the trend has normalized since.

***Total CFIT* Accidents in Alaska**
(Includes all Fatal and Non-fatal Accidents - in All FAR Types of Operations)



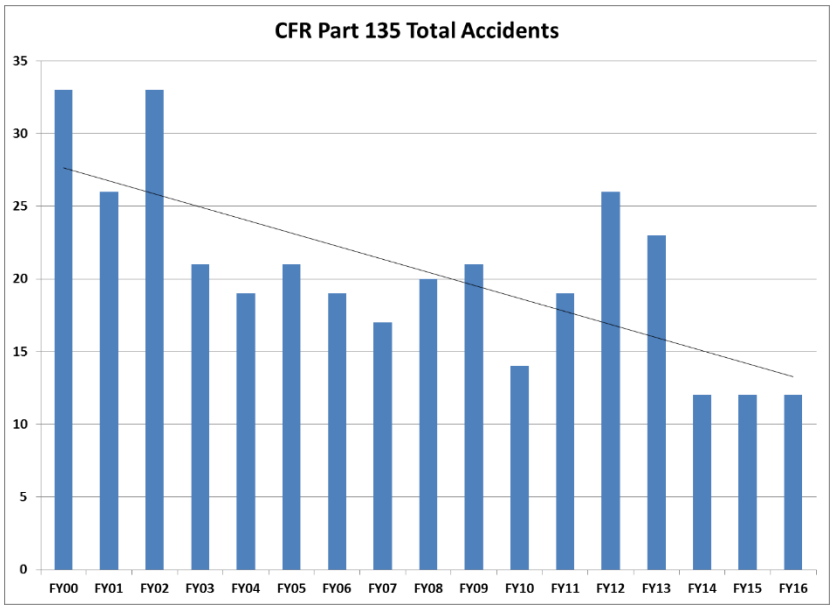
Additionally, as shown in the next chart below, the total number of CFIT accidents *involving only Part 135 commercial operators* --- fatal and non-fatal -- has also decreased since FY02, but has since remained relatively flat for the past decade with one or two occurring each year. As stated previously, any accident is one too many, and the FAA continues to aggressively pursue accident prevention efforts in Alaska for further reductions in CFIT accidents.

Total Part 135 CFIT Accidents in Alaska
(Includes all Fatal and Non-fatal Accidents - FAR 135 only)



This next chart below indicates that when all the other types of Part 135 commercial accidents in Alaska are considered - in addition to CFIT accidents – a dramatic reduction since FY 2000 becomes evident.

Total *Part 135* Accidents in Alaska:
(Includes all Fatal and Non-fatal Accidents – for all accident types)



The above chart depicts a validation of the efficacy of the risk controls initiated by the FAA and industry in Alaska to reduce accidents. When compared to the previous chart, it can be seen that Part 135 CFIT accidents made up only one-sixth of all Part 135 accidents in the FY 14, 15, and 16 timeframe.

Finding 10: The total number, and the rate, of fatal and non-fatal accidents in Alaska – including CFIT and Part 135 accidents --have been on the decline over the past two decades. Aviation safety in Alaska continues to experience significant improvement.

FAA Actions to Improve Aviation Safety in Alaska

Over the past two decades, the FAA and industry have expended significant efforts to reduce accidents in Alaska**.** The success of these efforts is due in large part to voluntary collaboration that go beyond the basic regulatory requirements. These efforts have given rise to risk controls meant to assure safer flight operations, and include the following:

- Single Engine IFR rulemaking
- The Capstone Program
- Weather Cameras
- The Medallion Foundation
- Enhanced Surveillance Programs

During his testimony at the NTSB public hearing, the manager of the Alaska Flight Standards Division stated:

> "It's a combination of … all these different programs that are going on: Capstone, Medallion, weather cameras. Every one of them … is part of a safety chain that we have … If you change that in any way, you may impact the reduction in accidents that we have…." [33]

In May of 2016, in an effort to provide Alaskan operators with additional safety guidance, the manager sent a letter to all owners and management officials of Alaskan-based 14 CFR Part 135 carriers regarding the recent significant increase of CFIT accidents.[34] This letter provided suggestions and guidance on multiple points to bring awareness of CFIT risks and strategies for their reduction.

During the NTSB public hearing, a Hageland pilot who had previously flown the accident flight route in IFR conditions was asked:

[33] NTSB Public Hearing transcript.
[34] Letter found in the NTSB docket.

> "On the day of the accident, both you and the accident flight chose to fly VFR. So if IFR was possible on that route and the OCC recommended IFR, can you talk about any additional pressures, any reasons why you chose to fly VFR rather than IFR?"

The pilot's response was:

> "There were no pressures for us to go VFR. But as Mr. Gillespie [the FAA POI for Hageland] mentioned, it is very difficult to fly that route IFR. If ATC doesn't give you your clearance right away, it's a whole lot easier with the current infrastructure that's out there for us to go VFR between those villages."

The FAA recognizes that Alaska has a higher CFIT accident rate than anywhere else in the United States. Factors for this likely include variable weather conditions, limited infrastructure to conduct IFR operations, and pilot safety culture. These factors place challenges on pilots to ensure passengers, mail and cargo get from point A to point B safely in Alaska. However, limited infrastructure, variable weather, and rugged terrain should lead to more flight cancellations and diversions, rather than accidents. Even though aviation safety has been substantially improved in Alaska over the past two decades, the continuing efforts by the FAA, NTSB, NWS, and other public agencies – working with air carriers and pilots -- are key to prevent additional accidents.

Finding 11: FAA's efforts to improve aviation safety in Alaska -- in conjunction with the efforts of other agencies, air carriers, and organizations -- have been substantial and effective. These efforts must continue if further reductions in CFIT accidents are to be realized.

SUMMARY OF FINDINGS

1. The pilots were properly certificated and qualified in accordance with Federal regulations and company requirements.

2. The airplane had no preimpact anomalies that would have precluded its normal operation.

3. The accident flight encountered deteriorating weather conditions as it approached rising terrain, and the point of impact was likely obscured by overcast clouds and restricted visibility at the time of the accident.

4. For unknown reasons, the pilot-in-command continued to fly in weather conditions that were below the required visual flight rule minimums, contrary to Federal Aviation Regulations.

5. The FAA responses to recent NTSB recommendations related to Hageland Aviation operations and Part 135 flight data monitoring programs have been classified by the Safety Board as acceptable.

6. Since the creation of the Polaris CMO in 2014, FAA oversight of Hageland has been aggressive, robust, and effective.

7. When taken in the aggregate, surveillance data for air carriers who are Medallion Foundation members indicate that they have a higher safety performance (i.e. lower risk indications) than those air carriers who are not members of Medallion.

8. The incorporation of all elements of the Medallion CFIT-A program into an air carrier's FAA-approved training manual is voluntary and maximizes the program's effectiveness.

9. Terrain Awareness Warning Systems provide enhanced safety for commercial aviation operations in Alaska, and the FAA is constantly evaluating design requirements and operations for potential improvements.

10. The total number, and the rate, of fatal and non-fatal accidents in Alaska – including CFIT and Part 135 accidents --have been on the decline over the past two decades. Aviation safety in Alaska continues to experience significant improvement.

11. FAA's efforts to improve aviation safety in Alaska -- in conjunction with the efforts of other agencies, air carriers, and organizations -- have been substantial and effective. These efforts must continue if further reductions in CFIT accidents are to be realized.