NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594
January 30, 2014

OPERATIONS / HUMAN PERFORMANCE

Factual Report (with 8 embedded images)

ANC13GA036

Contents

A. ACCIDENT

Operator:	State of Alaska, Department of Public Safety
Location:	Talkeetna, Alaska
Date:	March 30, 2013
Time:	2320 Alaska Daylight Time[1]
Airplane:	Eurocopter AS350 B3, registration: N911AA

B. OPERATIONS / HUMAN PERFORMANCE GROUP

Georgia Struhsaker
Group Co-Chairman
Senior Aviation Accident Analyst
Office of Aviation Safety (AS-70)
National Transportation Safety Board
Washington, DC

Aaron Sauer
Investigator-in-Charge
Senior Air Safety Investigator
Office of Aviation Safety (AS-CEN)
National Transportation Safety Board
Denver, CO

William J. Bramble, Jr., Ph.D.
Group Co-Chairman
Senior Human Performance Investigator
Office of Aviation Safety (AS-60)
National Transportation Safety Board
Washington, DC

C. SUMMARY

On March 30, 2013, at 2320 Alaska daylight time, a Eurocopter AS350 B3 single-engine helicopter, N911AA, impacted terrain while maneuvering near Talkeetna, Alaska. The airline transport certificated pilot and two passengers sustained fatal injuries.[2] The helicopter was destroyed by impact and post-crash fire. The helicopter was registered to and operated by the State of Alaska, Department of Public Safety (DPS), as a public aircraft operations flight under 14 Code of Federal Regulations Part 91. Instrument meteorological conditions were reported in the area at the time of the accident. The flight originated from the passenger rescue location at 2313 and was destined for an off airport location near Talkeetna.

[1] All times are Alaska daylight time (ADT) and based on a 24-hour clock unless otherwise noted. Time of accident is approximate.

[2] One of the passengers was a state trooper who was acting as a spotter for the pilot, and the other passenger was a person who was being rescued after his snowmobile got stuck in a remote area and he became hypothermic. For purposes of this report, the state trooper will be referred to as the trooper, and the other passenger will be referred to as the snowmobiler.

D. DETAILS OF THE INVESTIGATION

A total of 35 interviews of 34 people (one person was interviewed twice) were conducted. Five people, including the pilot's next of kin, were interviewed in Anchorage, Alaska, between May 6 and May 10, 2013. Eighteen people were interviewed in Anchorage, Alaska, between May 28 and June 6, 2013. Additionally, 12 people were interviewed by telephone. Further, the group collected and catalogued various paper and electronic records.

See Attachment 1 for a list of persons interviewed. For each interview, a transcript or summary is available in the public docket for this accident.

E. FACTUAL INFORMATION

1.0 History of Flight

See Attachment 2 for a timeline of key events and communications from the snowmobiler's 911 call to the accident.

1.1 Events Before the Accident Flight

The snowmobiler called 911 on his cellular telephone at 1935[3] and was connected to a dispatcher at MatCom.[4] He reported that while traveling from Larson Lake to Talkeetna, his snow machine[5] had gone off the track into a ditch and was now stuck in the snow under the "Intertie"[6] about 12 miles from Talkeetna.[7] See Figure 1 for a map of the accident area.

[3] Times are based on MatCom dispatch recordings, unless otherwise noted.

[4] MatCom, a public safety dispatch center located in Wasilla, Alaska, is a division of the Wasilla Police Department. The Alaska Department of Public Safety contracts with MatCom for dispatch services for the Alaska State Troopers and the Alaska Wildlife Troopers in the geographic area that includes Talkeetna.

[5] In Alaska, snowmobiles are commonly called snow machines.

[6] The "Intertie" is a major power transmission line that runs north-south and passes between Talkeetna and Larson Lake.

[7] From the snowmobiler's cellular telephone signal, the dispatcher determined his location as longitude -149.92580 and latitude 62.359825, which was about 6 miles west-northwest of Talkeetna.

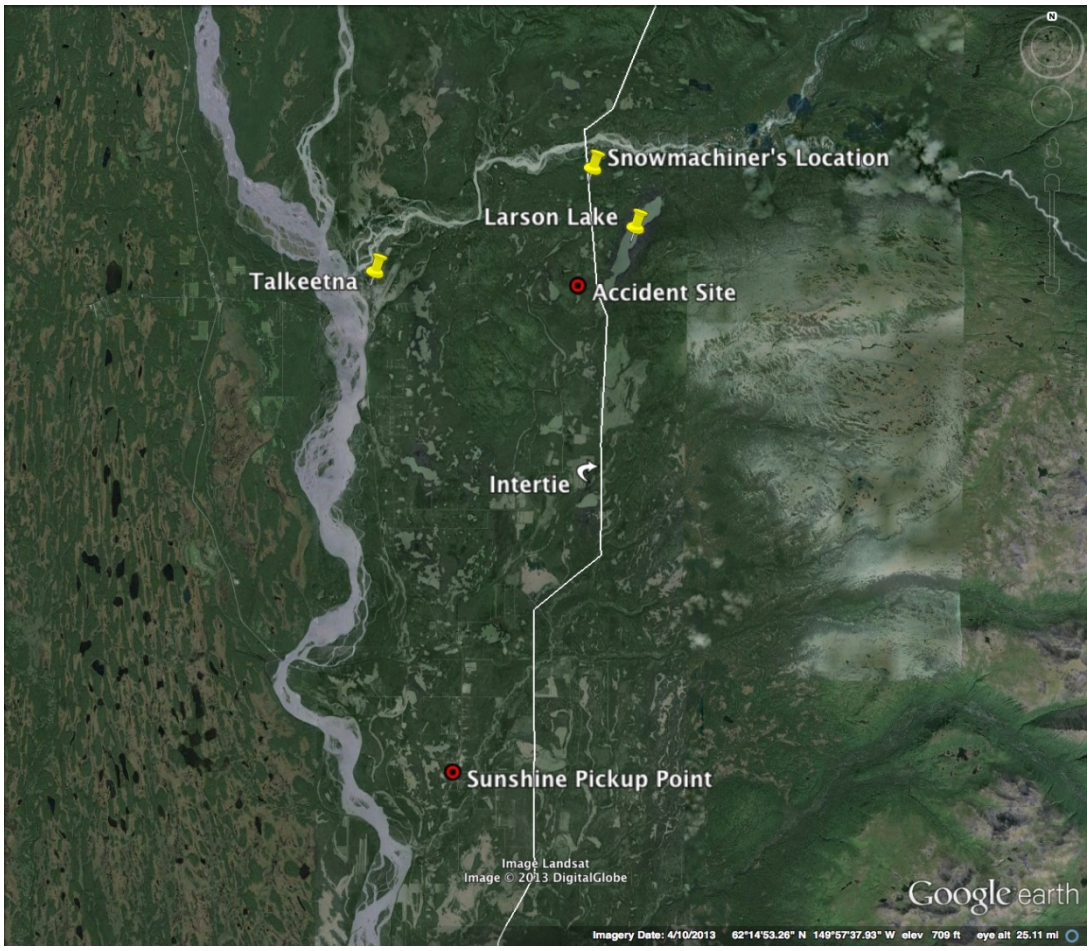

Figure 1. Map of accident area.

The snowmobiler told the dispatcher that he had bruised his ribs, but he did not seem concerned about this injury, rather he expressed concern that he would develop hypothermia if he was not rescued soon. The dispatcher obtained the snowmobiler's cellular phone number and informed him that she would have a state trooper call him back.

At 1940, the dispatcher notified the trooper, who was on duty at the Alaska State Troopers (AST) Talkeetna Post, about the snowmobiler's call. At 1944, the trooper asked the dispatcher if any Alaska Wildlife Troopers (AWT) units with snow machines and sleds (for transporting an injured person) were on duty, and she replied that no AWT units were on duty.[8] At 1945, the trooper asked the dispatcher to look up the phone number of a Talkeetna-area resident, who had assisted him with previous search and rescue (SAR) missions; however, the dispatcher was unable to find the number.

[8] The Alaska State Troopers and the Alaska Wildlife Troopers are both divisions of the Alaska Department of Public Safety. For more information about the department see section 5.0 of this report.

The trooper located the resident's number and called him about 1950.[9] According to the resident, he was experienced in mountain/back country SAR operations. When he got the trooper's call, he had just come inside from working around his residence, located about 6 miles north of Talkeetna, and it was overcast and starting to rain and snow. He said that the trooper was "almost impatient" as he told him about the stranded snowmobiler. The trooper wanted the resident to go by snow machine to search for the snowmobiler. The resident felt that the distance he would have to go to reach the snowmobiler was too far; he estimated 30 miles one way by snow machine. He told the trooper that he would call and see if there was anyone closer who could respond. After completing his call with the trooper, the resident spoke with two other local area residents both of whom had extensive SAR experience, and they advised him not to go out alone in the existing bad weather conditions to attempt to find the snowmobiler.

The snowmobiler's cellular telephone records (Attachment 3) indicate that at 2000, he received an incoming call from the trooper lasting 6 minutes 56 seconds.

About 2007,[10] the trooper again called the resident and asked him, "are you in or out?" The resident noted a sense of urgency in the trooper's voice. When the resident said that he was not comfortable going out to look for the snowmobiler, the trooper responded, "that's alright. I'll get the helo on it," and quickly ended the call. The resident felt that the trooper was in a hurry or rush to get the situation taken care of.

At 2009, the trooper radioed the MatCom dispatcher and obtained phone numbers for the AST on-duty SAR coordinator and the on-duty commander.[11] The on-duty SAR coordinator recalled receiving a call on his cellular phone from the trooper. The trooper explained the situation and, after some discussion, the coordinator and the trooper agreed that the use of the DPS's primary search and rescue helicopter, call sign "Helo-1," to retrieve the snowmobiler was appropriate.

At 2019, according to the pilot's smartphone records,[12] he received an incoming call from the on-duty SAR coordinator lasting 1 minute 59 seconds. The coordinator provided his recollection of this call with the pilot. He said he relayed details of the situation, and the pilot told him he had to check the weather before accepting the mission. The SAR coordinator asked the pilot to get back to him as soon as possible so that he could make alternative plans to retrieve the snowmobiler if the pilot could not fly.

The SAR coordinator recalled having a second call with the pilot during which the pilot told him that he would be able to fly the mission.[13] The pilot said that his plan was to pick up the

[9] Although the resident estimated that he received this call about 2030, based on MatCom and cellular phone records, the call most likely took place after 1947 and before 2000.
[10] The time of this call was estimated based on MatCom and cellular phone records.
[11] According to AST SAR protocol, all requests for the use of Helo-1, the accident helicopter, were made to the SAR coordinator. If the SAR coordinator approved, then the coordinator would notify the pilot, who would evaluate the weather and determine if he could accept the mission.
[12] These records are included in the Non-Volatile Memory Devices Specialist's Factual Report available in the public docket for this accident.
[13] The pilot's smartphone records do not show a second call with the SAR coordinator, however it is possible that the pilot called the SAR coordinator using a home telephone.

trooper, find the stranded snowmobiler, and transport him to a waiting ambulance. The pilot did not discuss the weather conditions. The SAR coordinator gave the pilot the trooper's contact information and the two men said goodbye.

At 2023, the pilot's smartphone records show an outgoing call to the trooper lasting 2 minutes 35 seconds.

The pilot's wife recalled that immediately after the pilot received the call notifying him about the mission he went upstairs to check the weather. He came down shortly thereafter dressed for flying and told her he was going to take the mission. She asked about the weather and he said it was "good." He departed his residence.

There is no record of the pilot obtaining a weather briefing by calling a Flight Service Station or accessing the Direct User Access Terminal Service (DUATS). It is unknown what other weather information sources the pilot may have accessed before deciding to accept the mission. The current and former Helo-1 relief pilots both said that typically they obtained weather information from the National Weather Service's Alaska Aviation Weather Unit (AAWU) website (http://aawu.arh.noaa.gov) and followed up with a call to a Flight Service Station to speak to a briefer only if they had a concern about the weather. The current Helo-1 relief pilot said that the pilot also used the AAWU website.

The weather forecasts that would have been available to the pilot at the time he received the notification of the mission included an area forecast issued at 1745 that expected scattered clouds at 2,000 feet, scattered to broken clouds at 6,000 feet, broken to scattered clouds at 12,000 feet and clouds tops to FL180. Isolated light rain and snow showers were forecast with visibility forecast down to 4 miles at times. No turbulence or icing conditions were forecast. The terminal aerodrome forecast for the Talkeetna Airport issued at 2008 expected a calm wind, visibility greater than 6 miles, light rain, a broken ceiling at 1,000 feet above ground level (agl), broken clouds at 1,800 feet agl, and overcast skies at 2,800 feet agl. The reported weather conditions at the Talkeetna Airport at 1953 were wind calm, 10 miles visibility, light rain, a broken ceiling at 1,000 feet agl, broken clouds at 1,800 feet agl, overcast skies at 2,800 feet agl, temperature of 2° Celsius (C), dew point temperature of 1° C, and an altimeter setting of 30.20 inches of mercury.[14]

At 2051, the pilot's smartphone records show an outgoing call to Signature Flight Support at Ted Stevens Anchorage International Airport (ANC). Two line service technicians who were on duty there at the time recalled the pilot calling Signature to ask for help towing Helo-1 out of its hangar, a routine request. They drove a tug across the airport to the hangar, arriving about 2100, and the pilot was waiting for them with the hangar door open.

One of the line service technicians got off the tug and exchanged a brief greeting with the pilot. He thought the pilot appeared "grumpy," perhaps because it had taken them 10 minutes to get to the hangar. The other line service technician, who remained on the tug, thought the pilot looked like he was "in the zone" and "ready to go." He operated the tug while the first technician served as a "wing walker," opposite the pilot. The line service technicians towed the helicopter

[14] For more meteorological information, see the Meteorology Group Chairman's Factual Report in the public docket for this accident.

out of the hangar as quickly as they could, said goodbye to the pilot, drove to the edge of the ramp, and waited. They watched as the pilot performed a walk-around inspection, boarded the helicopter, went through cockpit checks, and started the engine. They estimated that the helicopter's rotors were turning about 10 or 15 minutes after they had disconnected the tug. They saw the helicopter take off.

At 2117, the pilot radioed the MatCom dispatcher that he had departed Anchorage and was en route to "Sunshine," a landing zone located near the AST Talkeetna post.[15] He said that he had 2 hours and 37 minutes of fuel on board and his estimated time en route was 27 minutes.

At 2142, the pilot radioed the dispatcher that he was landing at Sunshine to pick up the trooper. At 2153, the pilot requested that the dispatcher ask the snowmobiler to turn on a flashlight, and at 2154, the pilot radioed that they had spotted the snowmobiler and were going to land nearby and then walk to his location.

Data retrieved from the Garmin GPSMAP 296[16] indicated that the helicopter departed Sunshine and proceeded north until it reached the Intertie. As shown in Figure 2, the helicopter continued north along the west side of the Intertie for about 0.6 miles, made a right 360° turn over the Intertie, and landed immediately west of the Intertie on the frozen snow-covered surface of a pond. The helicopter landed about 2156; the duration of the flight was about 11 minutes, and the landing spot on the pond was about 16 miles north of Sunshine.

A notebook that the pilot kept on his kneeboard and used to record details of his flights was recovered from the helicopter (Attachment 4). The pilot recorded the coordinates where the snowmobiler was spotted as N 62° 21.588' and W 149° 55.590'. This location was about 0.2 miles from the helicopter landing spot.

[15] The landing zone was near the Sunshine Tesoro gas station located at the intersection of the Parks Highway and Talkeetna Spur Road.

[16] For details on the data retrieved from the Garmin GPSMAP 296, see the Non-Volatile Memory Devices Specialist's Factual Report available in the public docket for this accident.

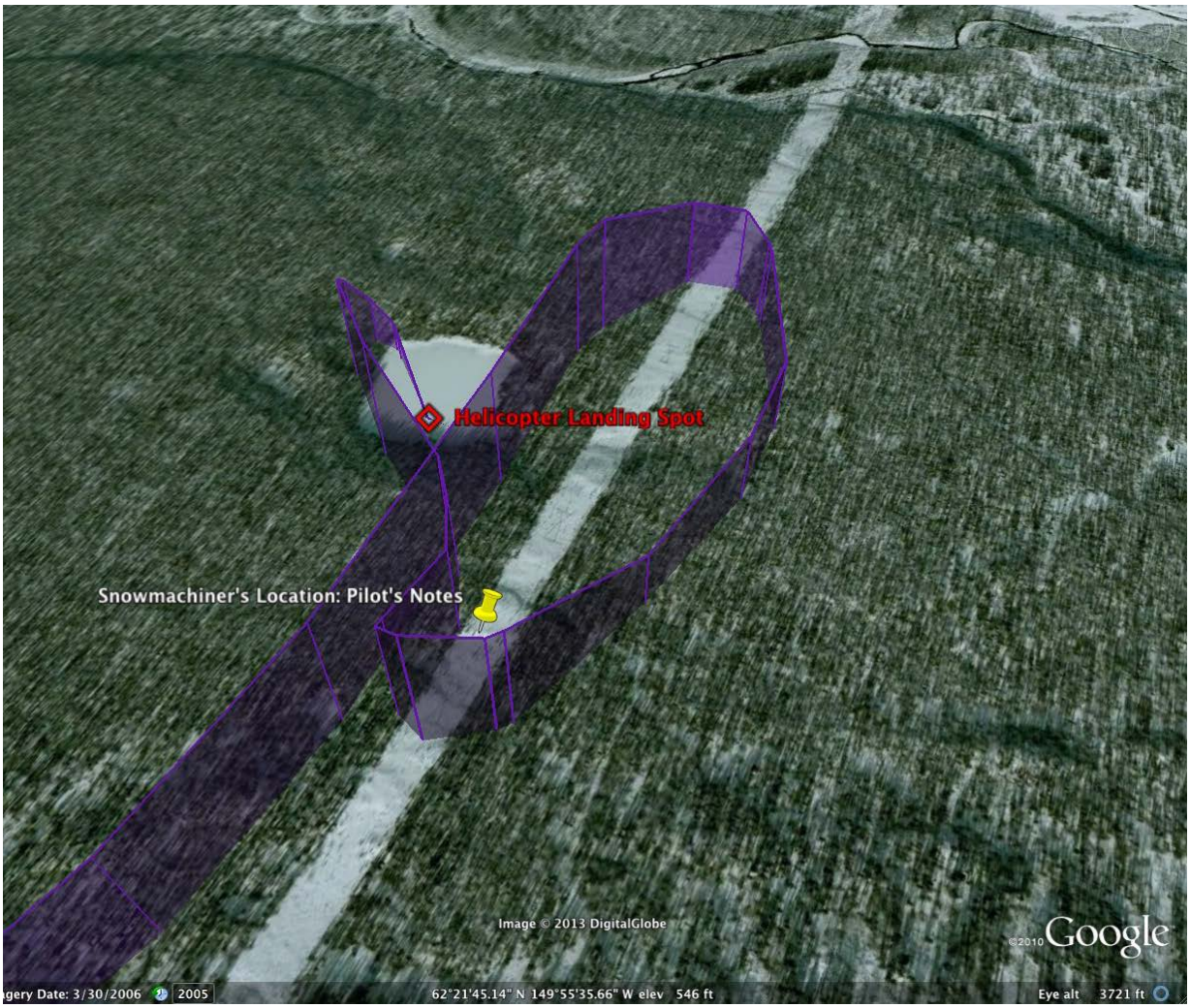

Figure 2. End of Garmin flight track from Sunshine to landing spot. Flight track is shown in purple.

At 2159, the trooper radioed the dispatcher that they were walking to the snowmobiler's location. At 2209, he asked the dispatcher to have the snowmobiler stand up so that he would be easier to spot in the deep snow, but the dispatcher advised that the snowmobiler was too weak to stand.[17] At 2220, the pilot and the trooper reached the snowmobiler.

The snowmobiler's snow machine was found parked on the frozen surface of the pond near two parallel linear marks in the snow with dimensions that corresponded to the helicopter's landing skids. (See Figure 3.) This strongly suggests that the pilot and trooper dug out the snow machine and used it for transportation back to the helicopter.

[17] Another dispatcher called the snowmobiler's cellular telephone and spoke to him while the trooper and the pilot were walking to him. The phone call began at 2201 and lasted about 19 minutes. The dispatcher terminated the call after speaking with the trooper when he and the pilot reached the snowmobiler.

Figure 3. Aerial photograph of helicopter landing spot. Red arrows point to marks made by helicopter's landing skids. Green arrow points to snow machine.

1.2 The Accident Flight

At 2316, the trooper radioed the dispatcher that the helicopter was en route back to Sunshine and requested that an ambulance meet them to transport the snowmobiler, who was hypothermic. This was the last recorded transmission from either the trooper or the pilot.

As shown in Figure 4, the Garmin GPS data for the accident flight indicated that the helicopter took off about 2313, intercepted and began to follow a true course of about 209° (close to the direct course back to Sunshine of about 193°). About 2314, the helicopter turned left to a heading of about 139° and continued on this heading until it reached the Intertie. About 2315, the helicopter turned right and flew south along the Intertie for about 30 seconds. The helicopter then turned right to a heading of about 190° and continued on this heading for about 2 minutes. At 2317:49, the helicopter was at an altitude of 1,060 msl (about 200 feet agl) with a groundspeed of 16 knots. The helicopter then entered a climbing left turn which continued through 360 degrees; this was followed by a series of erratic turns, climbs, and descents. The Garmin data for the accident flight ended at 2320:17; the duration of the flight was about 7 minutes; and the last position recorded placed the helicopter about 3 miles south of the takeoff point and 13 miles north of Sunshine.[18]

[18] The helicopter was equipped with an Appareo Vision 1000 recorder that was mounted on the roof of the cockpit. Image, audio, and parametric data recorded during the accident flight were recovered from the unit. For information about the audio and image data, see the Cockpit Image Recorder Group Chairman's Report, and for information about the parametric data, see the Onboard Electronic Recording Device Specialist's Factual Report.

Figure 4. Garmin flight track of accident flight. Flight track is shown in pink.

When the helicopter did not arrive at Sunshine, a search was initiated,[19] and the wreckage was located about 0930 on March 31, 2013. The accident site was about 200 feet north of the last recorded GPS position.

2.0 Personnel Information

2.1 The Trooper

The AST trooper who accompanied the pilot and served as a spotter during the accident mission was a commercial pilot with airplane single engine land, multi-engine land, single engine sea, and instrument ratings. He held a second class medical certificate issued on August 20, 2012, with no limitations. He owned a Piper PA-18 Super Cub, which he flew on his days off.

The trooper's wife said that he had previously accompanied the pilot on several missions in Helo-1 and that he enjoyed flying with the pilot. According to DPS personnel, he had received

[19] For information about the search for the helicopter, see the Survival Factors Specialist's Factual Report in the public docket for this accident.

no special training in acting as a helicopter crewmember. He was not qualified to use NVGs and was unfamiliar with the operation of the helicopter's Avalex mapping display unit.

According to the SAR reports completed by the pilot each time he flew a SAR mission, the trooper had most recently flown with the pilot on March 15, 2013 (Attachment 5).

2.2 The Pilot

The pilot, age 55, was a civilian pilot who served as the primary pilot for Helo-1. He lived with his wife of 31 years at a private residence located a 15-minute drive from the helicopter's hangar at ANC. He did not have any children living at home with him.

The pilot's wife said that the pilot was a morning person who woke every day at 0530 but sometimes went back to sleep until about 0800 on weekend mornings. Monday through Friday, he left for work between 0600 and 0615. His wife said that he went to bed early in the evening (about 2100 on weeknights and about 2130 on Friday and Saturday nights) so he would be rested if called to fly a mission and he fell asleep very quickly when he went to bed at night.

The pilot's wife said there had been no recent changes in the pilot's daily habits. She reported that he normally ate breakfast at a fast food restaurant on the way to work, ate lunch at home about 1100, and ate dinner at home between 1700 and 1800. She said he sometimes also ate a late evening snack. She reported that he visited a gym for cardiovascular exercise and strength training three or four days a week, normally in the afternoon.

According to the pilot's wife, one of the pilot's children had given birth to a grandchild a few months before the accident, and this had a joyous event for the pilot. Aside from that, she reported no significant recent changes in the pilot's personal life.

2.2.1 Professional Background

According to records provided by the pilot's family and DPS (Attachments 6 and 7), after graduating from high school, he served in the U.S. Army from 1975 to 1978. In the Army, he trained as an airframe and powerplant mechanic, and he was stationed in Germany where he performed aircraft maintenance.

After leaving the Army, he worked for Duncan Aviation in Lincoln, Nebraska as a mechanic and began training as a pilot. In 1982, he moved to Anchorage where he worked as a flight instructor for Gordon Aviation until 1985. From 1985 to 1988, he worked for several different companies. From 1988 to 2000, he worked as a manager and pilot for Trans Alaska Helicopters, a Part 135 helicopter operator in Anchorage. The pilot completed about 2 years of course work in business administration at the University of Alaska in Anchorage. In December 2000, he was hired by the DPS to be the primary pilot for Helo-1.

The pilot served in the Alaska Army National Guard from November 1984 to June 1994. From November 1984 to November 1990, he was assigned to an aviation unit in Anchorage, Alaska, and from December 1990 to June 1994, he was in the Individual Ready Reserve. He was honorably discharged from the Army on June 8, 1994.

Review of the pilot's DPS personnel file revealed that he had received ratings of "outstanding" or "high acceptable" on his yearly performance evaluations since joining the agency (Attachment 8).[20] The file contained numerous letters and emails of appreciation written by persons whom the pilot had rescued (Attachment 9). For example, an email dated September 27, 2012, addressed to the pilot's supervisor, stated, in part:

> "I wanted to tell you thank you for rescuing us during the flooding on the Talkeetna river. Your helicopter pilot…I will never forget. Out situation was pretty grim. We were surrounded by rising waters with no way to get out and one plane partially submerged. We didn't know it at the time all we could see was water, hear the major chunks of the bank crashing into the river and pray that the other creek on the other side of us didn't blow out any more than it was and take us and our plane with it. The rain just wouldn't stop…It was a long hard dark night. You have no idea how grateful we were to see the lights and actually hear the chopper blades coming towards us. Your pilot who was only asked to do a weather check pushed on through to get us out of that situation. He saved our lives. The weather wasn't all that great when he flew in and got us back to Palmer. He was great. [He] made sure we had no injuries and got us the heck out of dodge."

Additionally, the file indicated that the pilot had been commended numerous times by state officials including the governor (Attachment 10). Most recently, in 2011, the pilot received an honorable mention for the Governor's Denali Peak Performance Award in the category of Crisis Responder. Also, in 2008, the pilot and the on-duty SAR coordinator (who was a sergeant stationed in Girdwood, Alaska, at the time) received the Governor's Denali Peak Performance Award in the category of Exceptional Performance Team as well as a Commendation for Meritorious Service for saving the life of a kayaker on July 29, 2007. According to the commendation, the kayaker was caught in a bore tide in Turnagain Arm and knocked out of his kayak into extremely cold, turbulent ocean water. The pilot was able to hold the helicopter steady and close to the water's surface as the sergeant leaned out and pulled the kayaker from the ocean.

2.2.2 Certifications and Training

The pilot's certification history is summarized in Table 1. The pilot obtained a mechanic certificate with airframe and powerplant ratings on the basis of military experience in March 1980. In March 1980, he obtained a private pilot certificate with an airplane single engine land rating. In 1981, he obtained an instrument airplane rating; a commercial pilot certificate with airplane single engine land, airplane multi-engine land, and rotorcraft helicopter ratings; and a flight instructor certificate with a rotorcraft helicopter rating. In September 1982, he added an airplane single engine land rating to his flight instructor certificate, and in September 1983, he added a single engine sea rating to his commercial pilot certificate.

Table 1. The pilot's certification history.

[20] The rating levels were: unacceptable, low acceptable, mid acceptable, high acceptable, and outstanding. There was no performance evaluation report for the rating period January 16, 2008 to January 15, 2009, in the pilot's personnel file.

Certificate Type	Completion Date
Mechanic – Airframe and Powerplant	03/07/1980
Private Pilot – Airplane Single Engine Land	08/18/1980
Instrument Airplane Rating	04/01/1981
Commercial Pilot – Airplane Single Engine Land	04/10/1981
Commercial Pilot – Airplane Multi-engine Land	05/08/1981
Commercial Pilot – Rotorcraft Helicopter	06/14/1981
Flight Instructor – Rotorcraft Helicopter	07/17/1981
Flight Instructor – Airplane Single Engine Land	09/02/1982
Commercial Pilot – Airplane Single Engine Sea	09/06/1983
Instrument Helicopter Rating	01/15/1985
Airline Transport Pilot – Airplane Multi-engine Land	01/06/1986

From October 1984 to January 1985, the pilot attended a U.S. Army Rotary Wing Qualification Course at Fort Rucker, Alabama. He obtained a helicopter instrument rating on the basis of this military training in January 1985. He obtained an airline transport pilot certificate with an airplane multi-engine land rating in January 1986.

The pilot's flight instructor certificate was most recently renewed on April 30, 2012.

According to FAA records, because the pilot was involved in an accident on April 21, 2006,[21] in accordance with 49 U.S.C. 44709(a), the FAA requested that he undergo a commercial pilot re-examination given by an FAA inspector. The pilot successfully completed the re-examination on May 15, 2006, in a Robinson R-44. There were no records of any other certificate actions in the pilot's FAA records.

The pilot's training and check flights since joining DPS are listed in Table 2 (Attachment 11).

Table 2. The pilot's training and check flights 2001 to 2013.

Provider	Event	Completion Date
Flight Safety	Cessna 208 Initial Training	03/23/2001
Robinson Helicopters	Pilot Safety Course	10/05/2001
DPS	Check Flight – Bell 206L-3	10/20/2002
American Eurocopter	AS350 B3 Airframe Field Maintenance	11/08/2002
American Eurocopter	AS350 Series Field Maintenance Differences	11/08/2002
American Eurocopter	AS350 Transition Pilot Course	12/20/2002
DPS	Check Flight – Robinson R44	06/13/2003

[21] For information about this accident, see section 2.2.4 of this report.

DPS	NVG Training	12/18/2003
DPS	Check Flight – Robinson R44	07/28/2004
DPS	Check Flight – Robinson R44	07/27/2005
American Eurocopter	AS350 B3 Pilot Recurrency Course	08/19/2005
DPS	Check Flight – Robinson R44	05/02/2006
American Eurocopter	AS350 B3 Pilot Recurrency Course	09/29/2006
DPS	Check Flight – Robinson R44	08/29/2007
American Eurocopter	AS350 B3 Pilot Recurrency Course	10/21/2008
DPS	Check Flight – Robinson R44	09/11/2009
American Eurocopter	AS350 B3 Pilot Recurrency Course	11/11/2009
American Eurocopter	AS350 B3 Pilot Recurrency Course	10/26/2010
DPS	Check Flight – Robinson R44	03/16/2011
American Eurocopter	AS350 B3 Pilot Recurrency Course	11/01/2011
American Eurocopter	AS350 B3 Pilot Recurrency Course	11/20/2012
DPS	Check Flight – Robinson R44	03/18/2013

The pilot's training records indicated that he completed NVG training on December 18, 2003, and was authorized to use NVGs in accordance with "the department NVG and policy manual." According to the records, the NVG training included 6 hours of ground school and 4.4 hours of flight training, which was provided by other department pilots. The records specify that during one of the NVG training flights, inadvertent IMC operations were performed and that during another flight, blowing snow takeoffs were performed. There were no records found indicating any recurrent NVG training.

In the "Weather Restrictions" section of the pilot's DPS Flight Authorizations/Limitations form dated December 18, 2003, the box for "VFR Flight" was checked with no restrictions noted, and the box for "Night Flight" was checked with the restriction "Night Vision Goggle use w/ 500' ceiling and 2 miles visibility." This was the most recently completed copy of this form found in the pilot's records.

The pilot's performance evaluation report for 2009 listed as a goal for 2010, "attend a commercial initial NVG course to update his training in the NVG environment." A quotation dated October 13, 2009, for an NVG course including 8 hours of ground school and 5 hours of flight training to be given by Aviation Specialties Unlimited of Boise, Idaho, was found in the pilot's office (Attachment 12). However, the pilot's performance evaluation report for 2010 stated that "it was decided not to send [the pilot] to an commercial initial NVG course due to the cost of the course."

In the year before the accident, the pilot had completed one training activity. On November 20, 2012, he completed AS350 B3 pilot recurrency training at American Eurocopter in Grand Prairie, Texas. According to the training record, he received a total of 1.5 hours of flight training, which included normal and emergency procedures. The training did not include any instrument flight. According to American Eurocopter, none of the training courses the pilot had taken at their facility included any instrument flight.

The pilot's most recent DPS check flight took place on March 18, 2013. The check flight was conducted in a Robinson R-44 by an independent instructor, and it included a flight review in accordance with FAR 61.56 and the special awareness training required by SFAR 73 to act as pilot in command of a Robinson R-44. According to the instructor who conducted the check flight, no instrument maneuvers were performed.

Review of the pilot's training records indicated that other than the inadvertent IMC operations training given as part of his initial NVG training in 2003, the pilot had received no instrument flight training in a helicopter since joining DPS in December 2000. He had last received instrument flight training in an airplane in 2001 when he attended Flight Safety's Cessna 208 training course.

2.2.3 Flight Experience

At the time of the accident, the pilot had about 10,693 total flight hours of which about 8,452 hours were in helicopters. A review of the pilot's flight logbooks (#1, #2, and #3) indicated that he began logging flight time in June 1979 and continued to do so until shortly after he started working for DPS (Attachment 13). Before he started flying for DPS, the pilot had logged a total flight time of 7,278 hours of which 5,037 hours were in helicopters, 141.3 hours were actual instrument time, and 247.1 hours were simulated instrument time. [22]

Information provided by DPS indicated that since joining the agency, the pilot had flown a total of 3,415 flight hours of which 1,738 hours were on SAR missions (Attachment 14). He flew 242 hours in the year before the accident of which 239 hours were in Helo-1. He flew 23 and 8 hours within 90 and 30 days before the accident, respectively. His most recent flight before the day of the accident took place on March 18, 2013.

Helicopter Instrument Experience

The pilot's logbooks did not have separate columns for helicopter and airplane instrument time. Review of the logbooks revealed a total of 6 entries showing flights where instrument time was logged in a helicopter. These entries, which were all in logbook #2, are detailed in Table 3. The total helicopter instrument experience documented in the logbooks was 38.3 hours of which 0.5 hours was actual instrument time.

Table 3. The pilot's helicopter instrument experience.

Date	Helicopter Type	Instrument Flight
10/5/1984 to 01/11/1985	UH-1 (Bell 205)	25.3 hours[23]
06/20/1985	Bell 47G2A	2.5 hours

[22] These times are from the last fully completed and totaled page in the pilot's logbook #3. The last flight entered on this page was on October 17, 2000. There was one further partially completed page in logbook #3, and the last entry on this page was dated December 23, 2000.

[23] The pilot logged his U.S. Army Rotary Wing Qualification Course on one line in logbook #2. This entry included 0.5 hours actual instrument time and 24.8 hours simulated instrument time.

06/21/1985	Bell 47G2A	3.0 hours
07/28/1985	UH-1	2.5 hours
01/12/1986	UH-1	2.0 hours
01/13/1986	UH-1	3.0 hours
	Total	**38.3 hours**

NVG Experience

Review of the pilot's logbooks did not reveal any mention of NVG flight time, and the pilot did not indicate that he had any NVG experience on the resume he provided to DPS at the time he was hired. The military records from the pilot's U.S. Army Rotary Wing Qualification Course do not list any NVG flight time. It is possible that the pilot received NVG training and flew with NVGs during the time he was assigned to an Army National Guard aviation unit. Review of the pilot's logbook #2, which covered the time period during which the pilot was in the Guard, found that, following the entry for the Army Rotary Wing Course, there were entries for a total of 32.4 flight hours in the UH-1 of which 16 hours were at night.

DPS did not maintain a record of the pilot's NVG flight time. Review of the individual helicopter log sheets for the 6 months before the accident[24] indicated that the pilot flew 16.2, 13.2, and 2.2 hours using NVGs within the 6 months, 90 days, and 30 days before the accident, respectively (Attachment 15A). His most recent flight using NVGs before the day of the accident took place on March 15, 2013.

DPS did require that the pilot maintain a record showing that he met the NVG operating experience required by FAR 61.57.[25] This requirement was satisfied by the pilot completing a form titled "State of Alaska Department of Public Safety NVG Operating Experience, FAR 61.57 (f)(1)(2), (g), 61.31 (k) on an AS350B3 (Astar)." Copies of completed forms dating back to December 7, 2010, were located in the pilot's personnel file. The most recent form was dated March 15, 2013, which corresponded to the date identified from the helicopter log sheets as the pilot's most recent flight using NVGs before the day of the accident (Attachment 15B).

2.2.4 Prior Accidents and Incidents

Accident in 2006

The pilot was involved in a previous accident in Helo-1 that occurred about 0106 Alaska daylight time on April 21, 2006, during takeoff from a remote site located in the Big River Lakes area, on the western side of Cook Inlet, directly across from Nikiski, Alaska.[26] The helicopter

[24] The log sheets reviewed covered the time period from October 1, 2012, to the date of the accident.
[25] FAR 61.57(f)(1) requires that, to act as pilot in command of a helicopter in a night vision goggle operation with passengers on board, a pilot must, within 2 calendar months preceding the month of the flight, perform and log specified tasks as the sole manipulator of the controls on a flight during a night vision goggle operation. The specified tasks include three takeoffs and landings, three hovering tasks, three area departure and area arrival tasks, three tasks of transitioning from aided night flight to unaided night flight and back to aided night flight, and six night vision goggle operations.
[26] The NTSB accident number for this event is ANC06TA047.

sustained substantial damage, and the pilot and his two passengers were not injured. Dark night visual meteorological conditions prevailed, and the pilot was using NVGs for the takeoff from a snow-covered frozen lake. According to the NTSB Brief of Accident Report on the accident, the pilot stated that just after takeoff, as the helicopter transitioned from a hover to forward flight, blowing snow from the helicopter's main rotor momentarily reduced his visibility, and he lost all visual reference with the surface. While he was attempting to regain a visual reference, the helicopter's tail rotor guard and vertical stabilizer struck the surface of the lake, and he elected to abort the takeoff. The pilot reported that there were no preaccident mechanical anomalies with the helicopter and that he had not received any formal training in the use of NVGs. The NTSB determined that the probable cause of the accident was: "the pilot's failure to maintain adequate altitude/clearance from terrain during an aborted takeoff in whiteout conditions, which resulted in an in-flight collision with terrain. A factor associated with the accident was whiteout conditions."

DPS appointed an Aircraft Accident Review Board that conducted a separate internal investigation of the accident. The review board met on April 28, 2006. A memorandum dated May 2, 2006, that documented the review board's investigation (Attachment 16) listed the following "aggravating factors:"

- The pilot was aware of the blowing snow low visibility condition prior to takeoff.
- The pilot depended on a visual reference by using the edge of the lake.
- The aircraft was in close proximity to vegetation, and the blowing snow caused from the rotor wash did not have adequate room to dissipate and could have made the low visibility condition worse.
- The pilot had to execute a pedal turn in a blowing snow condition to verify his reference point prior to departure.
- The pilot did not execute an instrument takeoff when confronted with a blowing snow condition and choose to hover and use a reference point.
- The pilot did not use a cross check method and monitor his radar altimeter to verify his height above the ground.
- The pilot had worked for 18 days straight without a day off.

Under the heading "Probable Cause," the memorandum stated:

> The direct cause of the incident was the pilot's loss of visual reference with the ground while taking off. The loss of visual reference resulted in the momentary loss of aircraft control and resulted in the impact of the aircraft's tail into the lake ice. The loss of visual reference was a direct result of blowing snow caused from the rotor downwash as power was applied during takeoff. The pilot's landing site selection; positioning of the helicopter on landing; choice of VFR departure vs. an IFR instrument departure under the existing weather conditions when linked together led to this incident. Based upon the evidence presented it is this board's determination that the incident was a result of pilot error.

Under the heading "Recommendations," the memorandum stated, in part, that "it was agreed an instrument departure under the weather conditions and night operations would have been prudent." Also, it stated that "briefing a passenger to verbally report visual observations of

distance during departure, along with placing illumination sticks outside as reference points" would have been beneficial. The section concluded with the following paragraph:

> The intent of this board is not to provide any disciplinary action on the employee, [the pilot], but rather to suggest avenues for him to return to flight status for the Department. This board agrees that [the pilot] should comply with the FAA request of a check-ride in the Department R-44 helicopter as scheduled. After confirmation from Director's and Commissioner's office he should be provided an extensive Department check-ride so he can be evaluated and if successful be placed back on flight status as soon as practical. The Aircraft Section Supervisor and the check pilot can determine any additional training.

On May 2, 2006, the pilot successfully completed a DPS post-accident evaluation check flight in a Robinson R-44. The check airman was one of the DPS pilots who had given the pilot his initial NVG training in 2003.[27] On the form used to document the check flight, the flight time was listed as 0.3 hours, and the remarks section of the form stated, "although no blowing snow conditions were present, techniques used for blowing snow operations were discussed and evaluated. Recommend continued status as PIC."

As noted in section 2.2.2, the pilot successfully completed the FAA requested post-accident re-examination in a Robinson R-44 on May 15, 2006.

A memorandum dated August 29, 2006, with the subject, "Memorandum of Warning," addressed to the pilot from the highest ranking member of the aircraft accident review board, discussed the findings of the accident review board (Attachment 17). The memorandum stated, in part, that "the cause of the incident was due to pilot error. Specifically your momentary distraction within the cockpit from your instruments during the departure and the inability to transition from instrument to VFR flight resulted in a momentary loss of aircraft control." Additionally, it stated that "the board concluded that the incident might have been avoided if a proper passenger brief on cockpit sterilization was given along with the pilot maintaining proper focus on the aircraft instruments."

Further, the memorandum stated that "the damage to the aircraft was significant," and "the cost and impact on the department being without its search and rescue helicopter…was also significant." The memorandum concluded with the following paragraphs:

> The Department wants to ensure that you understand the importance of both physical and mental preparation before landing and/or taking flight. It is the Department's expectation that a briefing will be provided to members inside the aircraft to maintain a sterilized cockpit from noises and/or distractions and that this will become part of your standard passenger brief. Most importantly, it is expected that you will perform an evaluation and review of the environmental conditions and how they will affect your takeoff and/or landing before you execute them.

[27] The check airman was also one of the members of the aircraft accident review board.

> You are hereby warned. Any future occurrence of a similar incident may result in more severe disciplinary action. A copy of this memorandum will be placed in your personnel file for consideration at your next evaluation. You are hereby advised of your rights under your Collective Bargaining Agreement.

The pilot's performance evaluation report dated January 23, 2007, included the following paragraph:

> During this reporting period in April 2006, [the pilot] was involved in an accident while operating the AS-350B3 SAR helicopter. During the SAR mission [the pilot] faced very challenging weather conditions and had to manage the operational demands that pushed his equipment and physical capability to their limits. Although the accident caused damage to the helicopter which has since been repaired, no one was injured and both the Aircraft Section and [the pilot] learned some very valuable lessons. His cooperation during the investigation allowed the DPS to make significant changes to the Aircraft Operations Manual and address in the open the challenges that fatigue places upon flight crew during extreme operational demand periods. The AOM now provides clear guidance for all flight crews on duty day and flight duty limitations aimed at making aircraft section flight operations safer.

Over Speed Incident in 2009

The pilot was landing Helo-1 at ANC about 2000 Alaska daylight time on May 13, 2009, when an engine and rotor over speed occurred.[28] An investigation of the incident was conducted by an AST captain at the request of the colonel who was the director of AWT. According to the report of the investigation prepared by the captain (Attachment 18), the pilot stated that he was attempting to land the helicopter on its ground cart. The helicopter touched down on the right rear landing gear spring and bounced slightly. Because he was concerned that the bouncing could result in ground resonance, the pilot increased collective pitch to lift the helicopter off the cart. In a written statement included in the report, the pilot said that "just as [he] pulled collective the engine rapidly accelerated so [he] quickly completed the landing and forced the engine to ground idle." In an interview conducted by the captain, the shop foreman who supervised the aircraft section mechanics said that when he spoke with the pilot shortly after the event occurred, the pilot told him that as he pulled up on the collective to stop the bounce, it "popped" causing the helicopter to balloon. The pilot told the shop foreman that he quickly pushed the collective down. When interviewed by the captain, the pilot said that he did not move the collective in an aggressive manner when landing on the cart.

According to the DPS report, on the day of the incident, the pilot started work at 0800, and he had been on duty for 12 hours when the event occurred. He had flown the helicopter 5.8 hours that day.

The helicopter's Vehicle and Engine Multifunction Display (VEMD) indicated that both an over limit and a failure were detected. The over limit page showed that an engine and rotor over

[28] This incident was not investigated by the NTSB.

speed of 507 rpm (123.7%) lasting for 7 seconds had occurred.[29] The failure page showed a code indicating a stepper motor failure; the engine and rotor speed when the failure occurred was recorded as 386 rpm.

Aircraft section personnel reported the incident to Eurocopter and Turbomeca (the engine manufacturer), and Turbomeca requested that mechanics remove the engine's Digital Engine Control Unit (DECU) and send it to Turbomeca's facility in Grand Prairie, Texas. The memory reading of the DECU by Turbomeca confirmed the observed stepper motor fault on the VEMD. The DECU electronically controlled engine fuel flow via a Hydro-Mechanical Unit (HMU), and when the stepper motor (an HMU component that adjusts the fuel metering needle) failed, the metering needle in the HMU froze resulting in a fixed fuel flow. In this condition, when the pilot moves the collective up or down, fuel flow is no longer automatically adjusted to increase or decrease engine power, and the pilot must use the throttle twist grip on the collective to manually control the fuel flow.

The engine was removed and sent to Turbomeca for over speed inspection and repair. The Hydro-Mechanical Unit (HMU) was functionally tested and disassembled by Turbomeca. Turbomeca provided a report on the examination of the HMU to DPS. The conclusion section of the Turbomeca report (Attachment 19) stated the following:

> The "failure code" displayed at time of the event corresponds to the position of the metering needle control, revealing that the metering needle froze in position and prevented the HMU to control the fuel flow with DECU input.
>
> During disassembly, the HMU was found to have corrosion contamination on the metering needle assembly with fuel contamination in the neutral position switch, the presence of corrosion and contaminations of the fuel in the stepper motor actuator, the metering valve rack revealed axial play with wear on the resolver gear and play in the internal kinematics.
>
> The actual event could not be duplicated by each individual finding discovered during the investigation; this type of contamination could contribute to this type of HMU operational discrepancy causing the metering needle to freeze. It is probable that a combination of the findings observed led to the reported event however a clear and direct link between all these phenomena and the reported event was not possible to establish.

The "Conclusion" section of the DPS investigation report stated, in part, "the final cause of the over speed, based on the available information, is inconclusive."

When interviewed by NTSB investigators, the colonel who was the director of AWT recalled the over speed incident and said that "ultimately it wasn't determined that it was pilot error or a mechanical issue. It was unclear."

[29] 100% is equivalent to 406 rpm. The nominal rotor rpm for the helicopter is 394 rpm. Rotor rpms above 500 require that the main and tail rotor blades be scraped and numerous other items by inspected and overhauled.

According to Eurocopter (Attachment 20),[30] when the stepper motor failure occurred, a red "GOV" warning light would have illuminated and a "GONG" aural warning would have sounded to alert the pilot to the failure. The procedure in the Rotorcraft Flight Manual (RFM) for a red "GOV" failure requires the pilot to disengage a mechanical stop which holds the twist grip in the "FLIGHT" detent and then turn the grip left to increase fuel flow or right to decrease fuel flow. Eurocopter Service Letter No. 1702-71-05, dated April 12, 2006, addresses the use of the twist grip and states, in part:

> Reminder:
> In the event of a total FADEC-governor failure detected by the DECU, the engine fuel flow is frozen at its value at the moment of the failure. The engine power is therefore maintained. In stabilized flight, there is no urgency to modify the flight parameters and to adjust the twist grip. On the contrary, rapidly reducing collective pitch, without a synchronized reduction of the twist grip, will create rotor over speed. Flight control must then be smooth, avoiding abrupt actions.

The colonel said that around the same time as the over speed, there was another incident involving the pilot. In this incident, the pilot was flying a Robinson R-44 helicopter, and the tail rotor "may or may not" have struck water during a water landing. The colonel said that the pilot denied that this occurred. The colonel also mentioned the pilot's 2006 accident and said that when the pilot was asked about any of these events, "it was never his fault." He said that there was nothing he could do to "take sanctions" against the pilot without some reliable information to refute the pilot's statements. It was the combination of the over speed and the R-44 incident that prompted him to ask the aircraft section supervisor to find out about onboard monitoring equipment that could be installed in Helo-1. As a result, the colonel learned about the Appareo video recorder, and he insisted that it be purchased and installed.

Over Torque Incident in 2011

The pilot was conducting an external load operation in Helo-1 at Lake George, Alaska, about 1630 Alaska daylight time on April 15, 2011, when an over torque condition occurred.[31] In a written statement dated May 9, 2011, the pilot said that the purpose of the flight was to recover a Piper PA-18 from the surface of the lake (Attachment 21). The ski-equipped PA-18 had landed on the frozen surface of the lake and was trapped there by water that overflowed onto the ice. With the assistance of a ground crewman, the PA-18 was attached to a sling hanging from a long-line beneath the helicopter. The pilot slowly picked up the PA-18 and allowed the water to drain from its belly before he started to move it laterally. As the pilot moved the PA-18, wind was buffeting the helicopter, and this caused the pilot "to use more pedal which robbed additional power from the main rotor causing a momentary settling." The pilot said that he reacted to the settling by increasing collective and that this induced the over torque. He said that he was looking down at the PA-18 when he heard the warning horn make a short beep. He continued with moving the PA-18, and after setting it down, he landed the helicopter and shut it down. The pilot then brought up the information about the flight on the VEMD and found that it

[30] This information was not included in the DPS report on the 2009 over speed incident. It was obtained by the NTSB during this investigation.
[31] This incident was not investigated by the NTSB.

had recorded an over torque spike of 107% for 1 second. He performed an inspection of the rotor head and transmission support arms, found no damage, and signed off the inspection on the day's helicopter log sheet.

A memorandum dated May 5, 2011, from the aircraft section supervisor to the pilot (Attachment 22), addressed the over torque incident stating, in part:

> The over-torque condition necessitated a manufacturer-required inspection of the aircraft. You hold a Federal Aviation Administration (FAA) airframe & powerplant license and conducted this inspection yourself. After you inspected the aircraft, you failed to ensure that the incident was properly reported. No statement of the incident was generated by you.
>
> It was not until 04/27/11, that Aircraft Section maintenance staff was made aware of the over-torque due to the discovery of the over-torque inspection documentation in the aircraft logbook by an FAA inspector, and not until 04/28/2011, that I, as your immediate supervisor, was notified.

The memorandum continued with a discussion of the pilot's handling of a discrepancy with the helicopter's tail rotor pitch change links that he had found during a visual inspection on March 23, 2011. It then stated:

> As your immediate supervisor, it's my expectation that you will notify me of any condition which occurs to the aircraft that can affect the flight status of that aircraft. By not notifying me as soon as practical that the over-torque condition occurred or that there was a problem with the tail rotor pitch links, you did not follow the appropriate Aircraft Section Operations Manual policy as outlined in Chapter 3.04(E)."[32]
>
> You are also expected to notify the Aircraft Section shop foreman, either directly or through me, of any problems or concerns regarding the DPS aircraft that you fly.

The memorandum concluded by stating, "this letter is intended to be instructional in nature, correct this type of behavior, and for you to follow the appropriate course of action with respect to our rules and procedures in the future."

2.2.5 Colleague's Perceptions of His Flying Skills and Decision-Making

The pilot's helicopter flying skills and aeronautical decision making were described favorably by his colleagues. An Alaska Mountain Rescue Group (AMRG) observer, who estimated that he had flown over 300 SAR missions with the pilot (most recently in February 2013), described him as an excellent pilot who he "completely trusted." The AMRG observer said that the pilot did not take risks flying in bad weather and that he had been on missions with

[32] Chapter 3.04(E) of the AOM stated, "All mishaps involving a DPS aircraft including any accident, incident, injury or ground damage associated with an aircraft in any way shall be immediately reported verbally to the Aircraft Supervisor and the direct supervisor of the pilot responsible for the aircraft followed as soon as possible by an email synopsis of the event."

the pilot numerous times where they had to turn around because the weather was too bad to continue. He said that he was one of the passengers onboard during the pilot's 2006 accident in Helo-1, and he recalled that after the accident, he and the pilot had a discussion about flying in bad weather, and they decided that they would not put themselves at risk and that if the weather was bad, they were not going to go, but would stay put until it improved. When asked if the pilot ever displayed hazardous attitudes, the AMRG observer replied "no" and added that the pilot was "extra careful" because he wanted to avoid another accident or incident.

The relief pilot for Helo-1, who had flown with the pilot numerous times (most recently in November 2012), said that the pilot was the "best helicopter pilot" that he had ever flown with and that he had flown with a lot of people. He described the pilot as "a sound professional" and said that for "everything he did, he had a backup plan, and he was safe about it." The relief pilot had received flight instruction from the pilot in both Helo-1 and in the DPS's Robinson R-44s, and he recalled the pilot telling him over and over again not to "fight" or "push" the weather. He said that the pilot did not display hazardous attitudes, and regarding the accident flight, he expressed the opinion that "if the pilot had known the weather was bad, he wouldn't have pushed it."

The former relief pilot for Helo-1, who had provided the pilot with his NVG training in 2003 and had most recently flown with the pilot in December 2010, said that he rated the pilot's skill level as "average."

The recently retired aircraft section supervisor, who was a non-helicopter-rated pilot, characterized the pilot as a "very careful pilot." She said that although she had never flown with the pilot, she knew this because she had seen him in the office checking the weather before accepting a mission, and she had also received notifications that Helo-1 had been assigned to a SAR mission but was on hold because of poor weather conditions such as low ceilings or freezing rain.

The aircraft section commander, who was a non-helicopter-rated pilot and had flown with the pilot, said that the pilot had a "high level of proficiency" and was "always very professional." He characterized him as a "by the book" pilot. The commander said that he knew the pilot was cognizant of safety issues because when he talked with the pilot about his SAR missions, the pilot always discussed the conditions he encountered and how he compensated for them. He said that the pilot did not display hazardous attitudes, and that he did not consider him to be a "risk-taker." He recalled a discussion he had with the pilot about the risks involved in some of the SAR missions the pilot conducted including flying in bad weather and at night, and he said that the pilot told him, "I told them when I took this job that I would do this, and that's what I am going to do." The commander expressed the opinion that the pilot knew what the risks were and that he felt a self-imposed obligation to conduct SAR missions.

When asked to elaborate on the pilot's weather-related decision-making, the aircraft section commander described a rescue that the pilot performed in September 2012.[33] According to the section commander, two Piper PA-18 Super Cubs had landed on a gravel bar on the Talkeetna

[33] One of the individuals who was rescued wrote an email commending the pilot that is quoted in section 2.2.1 of this report.

River and gotten stranded by rising water. The three occupants of the Super Cubs had called on a satellite phone requesting rescue. A 210th Air National Guard Rescue Squadron crew attempted to reach the location in a Sikorsky HH-60 Pave Hawk helicopter but had to turn back when they were unable to cross a mountain pass due to poor weather conditions. The pilot stayed up all night and continued to check the weather until he saw a "weather window on the radar" that he thought would allow him to reach the location. About 0300, the pilot launched in Helo-1, and by using a different route that avoided the mountain pass where the Air National Guard crew was forced to turn back, he reached the location and rescued the three people. The section commander said that this mission demonstrated how "motivated and driven" the pilot was to perform rescues.

2.2.6 Recent Activities

The pilot's pre-accident activities were documented through interviews and records. On Wednesday, March 27, 2013, the pilot's wife estimated that he went to sleep about 2100 because that was his normal weekday bedtime. His smartphone records contained no activity that evening.

On Thursday, March 28, the pilot's wife estimated that the pilot woke about 0530, went to his office, and worked his normal schedule (0700 to 1530). The pilot visited Helo-1's relief pilot at DPS headquarters between 0700 and 1200. There, he discussed a proposed change in the pilot scheduling for Helo-1. DPS had proposed that the pilot take his regular days off on weekdays and arrange to have the relief pilot serve as the primary pilot on those days. The purpose of the change was to allow the pilot to have some time off duty each week. According to the relief pilot, the pilot was very upset about this because he earned a significant portion of his income from overtime and other forms of premium pay. The two discussed how they could make the change work, given the relief pilot's regular duties and outside flying with the National Guard. In addition, the two discussed plans for ferrying the department's new AS350 to Alaska when it was delivered, and the department's plan for hiring a new pilot to fly that helicopter. Those conversations were routine. About 1230, the pilot spoke with a friend and former pilot in the aircraft section by phone for about 20 minutes. They had not spoken in some time, and they spent most of the call catching up on personal matters. When the friend asked how work was going, the pilot just said it was "business as usual." The pilot's wife could not recall the pilot's activities that evening. She estimated that he went to bed about 2100 because that was his weekday bedtime. His smartphone records showed first activity at 0800 and last activity at 1533.

On Friday, March 29, the pilot's wife reported that the pilot woke about 0530 and worked his normal schedule (0700 to 1530) at the office. The primary Helo-1 mechanic recalled seeing the pilot and interacting with him at the hangar that day. The pilot was fielding calls from his wife who was asking him to do something about a car that was up on blocks in the driveway of a residence across the street from the pilot's residence.[34] The pilot confided in the mechanic that he was frustrated by the situation because his wife was insistent that he do something about it but the residence across the street was owned by a police officer and the pilot felt he could not do anything about it. The aircraft section commander recalled seeing the pilot leaving the main hangar around lunchtime. He recalled exchanging a greeting with the pilot who appeared

[34] The pilot's smartphone records show many incoming calls from his wife between 0800 and 1626 that day.

"normal." The pilot checked into his gym with his daughter at 1542. His daughter recalled being there with him for an hour to an hour and a half. After he finished up at the gym, the pilot went home, engaged in routine activities, and ate dinner. His wife estimated that he went to sleep about 2200. His smartphone records show first activity at 0836 and last activity at 1626.

On Saturday, March 30, the pilot woke by 0800 or 0900. He ate a late breakfast. After that, he ran errands. The pilot's smartphone records show first activity at 1151. In the early afternoon, he helped his wife clean the house in preparation for an Easter gathering the following day. In late afternoon, the pilot relaxed. At 1700 or 1730 he ate leftover pizza. About 1900 or 2000 he prepared a snack (nachos) and got ready to watch a movie on television. The pilot's wife recalled that he received a call notifying him about the accident mission on Saturday evening before he could eat his snack or watch the movie.

The pilot's estimated time in bed is summarized in Table 4.

Table 4. The Pilot's Estimated Time in Bed.

Date	Went to Bed	Woke Up	Time in Bed
March 27-28	2100	0530	8.5 hours
March 28-29	2100	0530	8.5 hours
March 29-30	2200	0800 - 0900	10 to 11 hours

2.2.7 Schedule and Compensation

The pilot's work schedule was Monday through Friday, 0700 to 1530, with an hour lunch break from 1200 to 1300. According to his wife and colleagues, however, he was always on call except when he took leave for a special family occasion or to use a few days of leave that he would otherwise have to forfeit.[35] An examination of the pilot's time sheet for the period March 16-31, 2013, indicated that he was on "standby" every day during that period (Attachment 23). According to the pilot's wife and colleagues, the pilot sometimes went off call temporarily when he exceeded flight or duty time limits and needed to rest.

The pilot's last day off was Saturday, March 9, 2013, and his last extended time off was a week-long family vacation in January 2013. Spring had been slow to arrive in Alaska so there had been less flying than usual in March 2013, and according to the pilot's wife and colleagues, the pilot's workload had not been very high in recent weeks. DPS records indicated that, prior to the accident, the pilot had not done any flying since he completed a flight review on March 18, 2013, and he had not worked outside of his normal office hours since Sunday, March 17, 2013.

The pilot was not salaried. He was paid for his work on an hourly basis and he was expected to work at least 40 hours per week. He received additional compensation (premium pay) for additional hours worked (overtime), for working in the evenings or at night (swing shift

[35] The pilot was required to use a minimum of five days of vacation time or forfeit it at the end of the year.

or graveyard shift pay differentials), for working on a holiday, and for being on call outside of normal work hours (standby pay). DPS records indicated that his pay for calendar year 2012 consisted of $66,820 in regular pay and $38,885 in premium pay (Attachment 24).

The recently retired aircraft section supervisor said that the pilot "definitely worked a lot of overtime." The supervisor said that when she first joined the aircraft section in August 2009, she had asked the pilot about the amount of overtime he worked, and he had told her that it was "an expected part of his job, and that when he hired on with the troopers they told him there was going to be a lot of overtime because of the nature of his job." She said, "I guess it was just a given that he was going to have overtime."

The aircraft section commander said that it was difficult to get the pilot to take time off. He said that he was "almost positive" that this was solely because the pilot did not want to miss out on any flying or overtime. He said that the pilot was dedicated to his job and that there was also an element of financial motivation due to the premium pay. The pilot told the section commander more than once that the premium pay he earned was important because it allowed him to support his family; the pilot was proud of the fact that his daughters did not have to pay for college and his wife did not have to work outside the home because of the money he earned. The section commander said that any time he talked to the pilot about adjusting his schedule or bringing in another pilot to share the standby duty, the pilot would complain that this was going to take away from his overtime pay.

The major who was the deputy director of AWT said that he had recently become aware of the amount of days the pilot was on standby and that his concern about this prompted him to discuss it with the lieutenant. He said that he proposed that the relief pilot take a few days of standby duty and was told by the aircraft section commander that the pilot would not like that. The major said that he replied "maybe we need to save [the pilot] from himself" and "nobody should be taking that much standby." He said that if a pilot were paid a salary rather than hourly pay, this might be beneficial because it would remove the incentive to work more hours in order to make more money.

The relief pilot said that the pilot wanted to be on standby because he wanted the overtime. The relief pilot said that he had offered to cover for the pilot if he needed a break and that he had done so when the pilot went on vacation or got sick. The relief pilot said that the pilot was "always worried" that, if somebody else flew the helicopter, then he would not be needed anymore.

2.2.8 Relationships with Coworkers

The aircraft section commander said that the pilot was "quiet, reserved, private" and did not socialize with his coworkers. He said that the pilot got along well with his coworkers except for the lead mechanic for Helo-1, where there was "some friction." The section commander explained that the pilot and the mechanic were at odds about how long it took to perform maintenance on the helicopter. The pilot was always concerned about being ready to launch on a moment's notice, and he would pressure the mechanic by asking how long a particular maintenance task would take. The mechanic would respond that he didn't know how long, but it

would probably be all day. That answer was not acceptable to the pilot, who felt that he needed to "tell headquarters" when the helicopter would be ready again. The section commander said that the pilot and the mechanic had come to him during the past winter and asked how they could fix this problem. He told them that the mechanic would say how long the helicopter would be out of service; he would pass that message to headquarters; and the pilot would just have to live with it until the mechanic was done. This seemed to alleviate the problem.

The recently retired aircraft section supervisor said that the relationship between the pilot and the lead mechanic for Helo-1 was "very contentious." She said that the pilot was "very meticulous about his helicopter" and that "sometimes he would prefer that things be done one way" but the mechanic "was doing something a different way." According to the supervisor, "both ways were legal and correct." She said that the relationship between the pilot and the mechanic had improved "a little bit" over the last year before her retirement in early March 2013.

The foreman who supervised the aircraft section mechanics said that the pilot and the lead mechanic for Helo-1 were both "strong-willed...Type A personalities" and that they had a history of "butting heads." He described an incident where the mechanic was repairing one of the helicopter's cabin door handles and had gone to lunch before completing the repair. The pilot became upset because he might have been called to go on a mission, and "the mechanic was gone to lunch with his helicopter disabled." The pilot had complained to the aircraft section supervisor, and she relayed the complaint to the foreman. The foreman said that he watched the mechanic complete the repair and that it took "less than 30 seconds." He said that it reached the point where, for a time, the aircraft section supervisor issued a policy (Attachment 25) stating that if the pilot needed to talk to the mechanic, a third person had to be present to witness the discussion.[36] However, over the last 6 months, the relationship between the two men had greatly improved, and there had been no complaints from either one of them.

The lead mechanic for Helo-1 said that, after a period of several years when he and the pilot did not get along, recently "things finally straightened out." The mechanic attributed the improvement in his relationship with the pilot to a complaint that he made to the FAA.[37] The complaint resulted in two FAA inspectors visiting the aircraft section and reviewing the helicopter's maintenance records. The mechanic said that the FAA inspectors found an entry in the records that showed an incident had occurred with the helicopter that the pilot had not reported to the aircraft section supervisor. (This was the 2011 over torque incident detailed in Section 2.2.4 of this report.) After the FAA visit, the pilot "changed 500 percent" and "would actually come in and sit down and talk" with him. The mechanic said that another reason for the improvement in his relationship with the pilot was that they had come to an agreement about the pilot's involvement in maintaining the helicopter. He explained that the pilot was "really upset because he wasn't in control" of the helicopter's maintenance and that when the maintenance staff conceded the responsibility for recordkeeping to the pilot, he "was happy with that." The

[36] Memorandums in the pilot's personnel file indicated that this policy was in effect from December 4, 2009, to February 26, 2010.

[37] FAA Program Tracking and Reporting System records for the helicopter indicated that on April 18, 2011, the Anchorage Flight Standards District Office received an anonymous complaint that a pilot was performing maintenance on the helicopter without writing up the discrepancies.

mechanic said that "he was fine with that" because he was "not very good on the computer" and did not want to do the recordkeeping.

The relief pilot said that the pilot did not get along with the lead mechanic for Helo-1 and that "he did not like some of the things that were being done, or they weren't done the way that he would like it done." He said that the pilot would not have the flown the helicopter if something was wrong with it, and he expressed the opinion that the maintenance on the helicopter "might not have been done to [the pilot's] standard, but I don't think there was anything that was done wrong."

The AMRG observer who flew frequently with the pilot said that the pilot "didn't find any good friends" at the aircraft section and that the pilot was "constantly having to watch what he said to whom." He said that the pilot was "always worried" about losing his job. The pilot told him after the 2006 Helo-1 accident that he thought he was going to be fired and, after the 2009 over speed incident, that he was being blamed for damaging the helicopter again.

A friend of the pilot, who worked for the aircraft section as a mechanic from 2004 to 2007, said that before the 2006 Helo-1 accident, the pilot "had full control of the maintenance and operation of the helicopter." After the accident, the maintenance responsibilities for Helo-1 were "piece by piece" taken away from the pilot, and the pilot was frustrated and uncomfortable because "he wasn't sure what was being done, if things were being done when they were supposed to be done." The friend said that the pilot "didn't have any confidence in the department as far as their ability to properly maintain the helicopter."

Another friend of the pilot, who worked for the aircraft section as a mechanic from1988 to 2009, said that during a conversation with the pilot on March 22, 2013, the pilot told him that he was "disgusted" with the quality of the maintenance being done on the helicopter. In particular, the pilot expressed his concern that, during an upcoming major inspection on the helicopter, a review of the records would show that some hoses that Eurocopter had said needed to be replaced within a certain amount of time had not been replaced. The friend said that he had asked the pilot if he had talked with his supervisors about the hoses, and the pilot had replied that "the supervisors told him that's not his concern, his job is to be a pilot."

3.0 Helicopter Information

Helo-1 was the DPS's primary SAR aircraft. It was a Eurocopter AS350 B3 helicopter, serial number 3611, manufactured in France in 2002. The helicopter's FAA airworthiness certificate was issued on December 17, 2002. FAA registration records show that the helicopter was registered to the Alaska DPS on December 18, 2002.

Figure 5. Photograph of the helicopter taken on August 13, 2010.

The helicopter was powered by a single Arriel 2B free turbine engine. It was equipped with a three blade main rotor system which rotated clockwise (when looking from above), a conventional tail rotor, and high skid landing gear furnished with an inflatable float system and snow shoes. It had various modifications including extra-large side luggage holds, an Appareo Vision 1000 recorder system, an Avalex AMS-7000 mapping display system, a tactical radio system, a radio altimeter, and NVG-compatible instrument panel lighting.

The AS350 B3 model is certified for flight in day and night visual meteorological conditions (VMC). It is not certified for flight in instrument meteorological conditions (IMC).

3.1 Flight Instruments and Navigation Equipment

Flight Instruments

Helo-1 was equipped with the basic flight instruments for controlling an aircraft by reference to instruments including a turn and bank indicator, an attitude indicator, and a heading indicator. As shown in Figure 6, these instruments were installed on the right side of the instrument panel directly in front of the pilot's seat. The heading indicator, mounted in the center of the right side of the instrument panel, was a Bendix KI-525A horizontal situation indicator (HSI).

Figure 6. Photograph of the right side of the helicopter's instrument panel taken on June 18, 2012. The small screen on the lower right side of the photograph is the Garmin 296 GPS unit.

The attitude indicator was an AIM 1200, part number 504-0121-906, model number 1200-1R(10D), which was manufactured by B.F. Goodrich Avionics Systems.[38] It was installed in the helicopter on April 4, 2003, by Avionics Specialists of Alaska, Anchorage, Alaska (Attachment 26).[39] The Installation and Operation Manual for the AIM 1200 series (Attachment 27) stated that the unit met the requirements of TSO-C4c (Attachment 28). The manual said that the unit was capable of operation through 360 degrees of aircraft pitch and roll displacement. The manual did not include the unit's pitch indicating range. When questioned by an NTSB investigator, a representative of L-3 Avionics Systems answered that "+/- 20 degrees is indicated. Full movement covers +/-25 degrees approximately."[40]

The attitude indicator was equipped with a caging knob. Regarding the use of the caging knob, the operating procedures included in the installation manual for the attitude indicator stated:

[38] L-3 Avionics Systems bought B.F. Goodrich Avionics Systems in February 2003.
[39] An FAA Form 337 dated April 4, 2003, documented the installation of the attitude indicator and the components of a Honeywell KCS-55A Pictorial Navigation/Directional Gyro Display including the KI-525A horizontal situation indicator.
[40] TSO-C4c states: "The range of indication in pitch shall be at least plus or minus 25 degrees."

> If caging is required, caging should be accomplished when the aircraft is in a wings level, normal cruise attitude, as indicated by other instruments or the horizon. If the gyro is caged when the aircraft is not in this attitude, the resulting attitude presentation immediately after caging will be in error by the difference between true vertical and actual aircraft attitude. Errors will erect to true vertical in pitch and roll at 2.5° per minute minimum (5° nominal).

The AMRG observer who often flew with the pilot said that the turn and bank indicator worked but that there was "a problem with it" and that most of the time the circuit breaker was intentionally pulled out to turn the unit off. The AMRG observer did not know the nature of the problem. He said that sometimes the pilot would ask him to push the circuit breaker in so that the unit would operate. This typically happened when they were maneuvering at low altitude. A photo of the circuit breaker panel retrieved from the pilot's smartphone (Figure 7) shows the circuit breaker in the off position.

The only maintenance discrepancy noted in the helicopter's records that concerned the turn and bank indicator was on an Avionics Specialists of Alaska work order dated September 9, 2004. (Attachment 29) The sixth item listed on the work order stated "T&B [Turn and Bank] makes noise in Headset. Removed T&B to facilitate testing not able to reproduce problem. Note: T&B is powered from Avionics Buss."

Figure 7. Photograph of the helicopter's circuit breaker panel taken on June 18, 2012. The circuit breaker for the turn and bank indicator is in the off position (pulled out).

Navigation Equipment

Helo-1 was equipped with three separate devices capable of providing GPS navigation information: a panel-mounted Garmin GNS-430, a portable Garmin GPSMAP 296, and an Avalex AMS-7000 mapping display system.[41]

The Garmin GNS-430, which was mounted in the helicopter's center console (shown in Figure 8), was a combined communications radio, VOR/ILS navigation radio, and GPS receiver. It was coupled to the KI-525A HSI, and the input to the HSI could be switched from VOR/ILS to GPS by pushing the button labeled "CDI" on the GNS-430. The GNS-430 did not have the capability to store flight data.

Figure 8. Photograph of the left side of the helicopter's instrument panel taken on June 18, 2012. The large screen on the left side of the photograph is the Avalex mapping system display screen. The lighted screen in the lower center of the photograph is the Garmin GNS-430.

The Garmin GPSMAP 296, which was mounted to the right of the helicopter's instrument panel (shown in Figure 6), was a portable GPS unit with a color-display measuring about 3 inches wide by 2 inches tall. As previously mentioned, data was retrieved from this unit after the

[41] The helicopter was also equipped with two VOR/ILS receivers. One was part of the Garmin GNS-430 and the other was part of a Honeywell KX-165A radio that was installed in the left side of the instrument panel. The KX-165A was coupled to a KI-206 course deviation indicator that was also installed in the left side of the instrument panel.

accident; for details see the Non-Volatile Memory Devices Specialist's Factual Report in the public docket for this accident.

The Avalex AMS-7000 mapping display system consisted of several components including a processor unit or map box, a display, and a keypad control unit. The processor unit, which was mounted beneath the cabin floor, stored digital maps, housed an internal GPS receiver, and contained all of the system software. The display, which was a 12-inch flat screen monitor, was mounted on the left side of the instrument panel (shown in Figure 8). There were six buttons on the lower right side of the front of the monitor for use in controlling the display; two of the buttons were for increasing and decreasing the brightness of the display. The keypad control unit was mounted in the center console. The keypad incorporated buttons for various functions including selecting map orientation (NUP for north up and TKUP for track up), selecting map type, and zooming in and out on a displayed map. The types of maps that could be selected included street maps (STRT), topographic maps (TOPO), aeronautical charts (AERO), and nautical charts (NAUT).

The AMRG observer who flew frequently with the pilot characterized the Avalex AMS-7000 as a complex unit that would be difficult to operate without familiarization training.

3.2 Weight and Balance

The helicopter's flight manual lists the maximum gross weight as 4,961 pounds with the center of gravity limitations between 125.1 to 135.8 inches. The operational empty weight listed in the helicopter's weight and balance records was 3,319.7 pounds with a longitudinal arm of 136.1 inches.

From driver's license records, the pilot weighed 180 pounds, the trooper weighed 210 pounds, and the snowmobiler weighed 180 pounds. Aircraft section personnel estimated that the weight of the survival equipment and rescue gear that the pilot routinely carried in the helicopter was about 275 pounds. The helicopter had a fuel capacity of 143 gallons. Fuel records from Signature Aviation showed that the helicopter was topped off with fuel on March 17, 2013; the helicopter's log sheets indicated that the accident mission was its first flight since this fueling. When the accident occurred, the helicopter had been flown about 1 hour since refueling, and using a fuel burn rate of 50 gallons per hour, there were about 93 gallons of fuel remaining.

Based on the above information, when it departed Anchorage, the helicopter weighed about 4,747 pounds and its center of gravity was about 133.7 inches. At the time of the accident, the helicopter weighed about 4,797 pounds and its center of gravity was about 129.0 inches (Attachment 30).

3.3 Night Vision Goggles (NVGs)

The DPS aircraft section had five pairs of NVGs; all were ITT F4949 series goggles, which are commonly referred to as ANVIS-9 goggles. According to the section's Aircraft Operations Manual (AOM), the goggles were serviced every 6 months by a qualified contractor. Pieces of one pair of goggles were recovered from the accident site. The model number of this pair of

goggles was 274401, and the serial number was 18937. Records indicated that the goggles had been inspected and found serviceable by Aviation Specialties Unlimited, Inc., Boise, Idaho, on March 22, 2013 (Attachment 31).

4.0 Medical and Pathological Information

The pilot's wife said that the pilot's health was good and he did not have any significant medical conditions. She stated that his last illness was a cold or respiratory virus in January or February of 2013. He had taken antibiotics for the illness and it had lasted about one week. She stated that he took Nexium for heartburn, but otherwise avoided use of medication, even over-the-counter medication. In addition, his wife stated that he drank alcohol very infrequently (and only when he was on vacation) and that he did not use tobacco products. She stated that he did not snore loudly at night or exhibit other signs of possible sleep disorders.

The pilot's most recent FAA second class medical certificate was dated August 23, 2012. It bore the limitation, "Must wear corrective lenses, possess glasses for near/intermediate vision." The pilot's visual acuity was reported as follows:

Distance vision:	20/40 corrected to 20/20
Near vision:	20/200 corrected to 20/20
Intermediate vision:	20/100 corrected to 20/40

For item 17a, current medications, "Nexium: one capsule daily" was listed. FAA records indicate that the pilot had been prescribed Nexium or a similar medication for gastro-esophogeal reflux disease since 2006 and that the condition was well controlled. The response option "no" was checked for all 23 medical conditions and issues listed in question 18 "Medical History." No information was listed for item 19, "Visits to Health Professionals in the Last Three Years."

An autopsy report provided by the State of Alaska State Medical Examiner's Office concluded that the pilot's cause of death was "blunt force and thermal injuries sustained during a helicopter crash" and listed the manner of death as "accident." The report noted some atherosclerotic plaque formation and stenosis in the pilot's cardiovascular system.

Biological specimens from the pilot's body were forwarded to the FAA's Civil Aerospace Medical Institute for toxicological testing. These specimens tested negative for ethanol and a range of legal and illegal drugs.[42] (Attachment 32)

5.0 Organizational Information

The Alaska DPS has two major divisions, AST and AWT. AST is charged with statewide law enforcement, prevention of crime, pursuit and apprehension of offenders, service of civil and criminal process, prisoner transport, central communications, and search and rescue. AWT is charged with enforcing fish and game regulations; AWT troopers also enforce criminal laws and

[42] Immunoassay and chromatography were used to screen for the following drugs: amphetamine, opiates, marihuana, cocaine, phencyclidine, benzodiazepines, barbiturates, antidepressants, antihistamines, meprobamate, methaqualone, and nicotine.

participate in search and rescue operations. The aircraft section is a specialized unit of AWT responsible for maintaining the department-owned aircraft fleet of 38 airplanes and 4 helicopters (3 Robinson R-44s and Helo-1) and for providing training to all department pilots, the majority of whom are commissioned troopers. Each of the department's aircraft is assigned to a particular AST or AWT section, and it is considered to be an asset of that section, not of the aircraft section. When a trooper is designated as a pilot, their pilot duties are in addition to their regular trooper duties, and that trooper remains assigned to their detachment and is supervised by the detachment chain of command. The aircraft section directly employs civilian pilots (such as the accident pilot) whose primary job functions are to operate aircraft and provide flight training.

At the time of the accident, the aircraft section had an assigned staff of 13 people consisting of 6 mechanics, 3 pilots, 2 administrative assistants, the aircraft section supervisor, and the aircraft section commander. The aircraft section supervisor's position was vacant due to the retirement of the person who held that job on March 8, 2013.

The part of the "State of Alaska, FY2014 Governor's Operating Budget" document (Attachment 33) that discussed the aircraft section stated that the section's core services were to:

- Provide aircraft services to the Department of Public Safety for transportation of prisoners, search and rescue missions, criminal investigations, and law enforcement support to the citizens of Alaska.
- Provide aircraft services to the Office of the Governor.
- Provide aircraft services to the Department of Corrections for transportation of prisoners.
- Provide annual training to all department pilots through flight instruction and safety seminars.

According to the budget document, in fiscal year 2012,[43] DPS aircraft flew 6,003 hours in support of department missions. The 4 DPS helicopters[44] flew over 858 hours, including 199 hours on search and rescue, 442 hours on patrol, 80 hours of pilot training, 21 hours of administrative flights, and 75 hours aiding investigation and apprehension. The helicopters rescued 74 persons, assisted troopers with almost 1,200 public contacts, and flew 17 persons on medical evacuation flights.

5.1 Aircraft Section Chain of Command

According to the aircraft section commander, the chain of command for the aircraft section was:

Commissioner of Public Safety
Colonel, Director of AWT
Major, Deputy Director of AWT
Captain
Lieutenant, Commander of Aircraft Section
Supervisor of Aircraft Section

[43] The State of Alaska's fiscal year 2012 was from July 1, 2011, to June 30, 2012.
[44] In addition to Helo-1, the DPS owned and operated 3 Robinson R-44 helicopters.

The section commander said that the captain and major were not pilots and that the colonel was a pilot; "generally he was able to go directly" to the colonel, who made "a lot of the ultimate decisions." He said that his position had been created by the colonel in August 2011, and that his function was to act as a liaison between the aircraft section supervisor, who was a civilian, and the commissioned troopers. He provided guidance to the section supervisor who "ran the business" and oversaw the aircraft section mechanics and administrative staff. Before he came, the supervisor had been asking the colonel for guidance, and after he came, "when troopers in the field had questions about needing maintenance or an airplane or something," instead of the supervisor asking the colonel, he responded to their questions. Since the aircraft section supervisor retired, he had been filling that position as well as his own. He said that he was planning to retire on September 27, 2013.

The recently retired aircraft section supervisor, who held the position from August 24, 2009, to March 8, 2013, said that initially she reported to the captain, then she reported to the colonel, and most recently she reported to the aircraft section commander (lieutenant). She said that she supervised the maintenance shop foreman, three pilots, and the administrative assistant; the shop foreman supervised five mechanics, and the administrative assistant supervised the office assistant. The supervisor explained that she was listed as the pilot's supervisor, but "in reality" he was supervised by the AST SAR coordinator, and she "wasn't even involved in any of his flights." The SAR coordinator contacted the pilot directly regarding SAR missions. The supervisor was responsible for approving the pilot's time cards, and she was involved if he needed to purchase equipment for the helicopter.

The supervisor said that she was aware when she was hired in 2009 that she was the fifth person to hold the position in 5 years,[45] and when she asked why there had been so much turnover, she was told that it was "because of the money. The position doesn't pay enough." However, she found out over time that this was not the reason why people left; it was because the position "doesn't have any authority." The supervisor explained that, in the section's Aircraft Operating Manual (AOM), "it says in many places that the aircraft supervisor does this, or the aircraft supervisor does that;" however, "that's not true. Actually, headquarters directs or makes a decision on those things even though it says in the manual that the supervisor does." She said that if she made decisions the aircraft section staff did not like, they would just go around her to headquarters, and that "a lot of times" decisions were made that she was not involved in and would inadvertently find out about. She described a frustrating event that occurred shortly after she was hired. The organization chart showed that she supervised a pilot located in Bethel, Alaska, and she contacted the detachment commander and said that she needed the pilot to come to Anchorage for training. The detachment commander replied that the pilot could not come and told the section supervisor that the pilot "belonged" to the detachment and that he was the one who supervised the pilot.

The supervisor said that, within the past year, a couple of pilot positions were taken out of the aircraft section and assigned to AST detachments. She thought this was a "bad idea" because there would be no oversight of those pilots regarding aircraft section policies and procedures.

[45] DPS provided the dates of service for the most recent 6 aircraft section supervisors as: 7/16/1997 to 2/15/2004, 7/12/2004 to 12/1/2005, 12/27/2005 to 5/26/2006, 7/17/2006 to 4/14/2007, 4/2/2007 to 5/1/2009, and 8/24/2009 to 3/8/2013.

She said she wrote a strongly worded email to everyone in the chain of command expressing her opinion and that the response she received was "that's just what's happening." The supervisor said that she had decided to leave the section because she did not feel there was ever going to be any change in the way they were operating. A couple of weeks before she gave notice that she was leaving, a trooper pilot nosed over a Piper PA-18 Super Cub at a remote site; he and his supervisor, neither of whom was an airframe and powerplant mechanic, changed the propeller; and the trooper pilot then flew the airplane back to his base. She said that this was an example of the fact that certain pilots could just do what they wanted and did not have to follow policies and that it was this specific instance that prompted her to give notice.

5.2 Budget

Table 5 shows the operating budget of the aircraft section for fiscal years 2010 through 2013. The table also shows the amount spent each fiscal year on training for pilots and mechanics (Attachment 34).

Table 5. Actual operating budget of the aircraft section and amount spent on training for fiscal years 2010 to 2013.

	FY2010	FY2011	FY2012	FY2013
Aircraft section	$5.22M	$5.52M	$5.58M	$5.90M
Training for pilots and mechanics	$70,200	$70,300	$50,200	$83,700

The aircraft section commander said that money was "always an issue." In the 2 years that he had been with the aircraft section, it was "typical about halfway through the year" to be asked to reduce spending or trim the budget. One of the items that might be cut would be training such as emergency maneuvers training for a pilot or sending a mechanic to a specialized school. He did not recall ever having denied or cut any training for the pilot.

The recently retired aircraft section supervisor said that she "didn't really have any control over the budget, which was very frustrating." She said that the section never had enough budget at the beginning of the year "to do the operations and do the training." The supervisor did not believe the budget for pilot training was adequate. She said that there were a couple years when pilots were scheduled to go for training to get their commercial or instrument rating and headquarters cancelled the training because of a lack of funds. In 2012, headquarters canceled the annual pilot safety seminar because of a lack of funds. The 3-day seminar was budgeted to cost about $10,000. The supervisor felt that it was important to have the seminar every year because it was the one time a year when the 40-some trooper pilots were brought together from their stations around the state in order to receive information about safety issues.

The colonel said that traditionally, the department held an annual pilot safety seminar, but that it had not always happened because of budgetary concerns. In 2013, the seminar was held, but in 2012 it was not. The reason the seminar was not held in 2012 was because "a lot of that training money" went to training all DPS personnel on a new police report writing system.

5.3 Aircraft Section Policies, Procedures, and Practices

The aircraft section had an 18-chapter Aircraft Operations Manual (AOM) in effect at the time of the accident. The most recent revision of the manual was dated January 14, 2013. Information about the aircraft section's policies, procedures and practices was obtained from the AOM and interviews of aircraft section personnel.

See Attachment 35 for pertinent excerpts from the AOM.

5.3.1 Operational Control and Go/No-Go Decisions

The AOM did not include requirements for anyone other than the pilot to be involved in flight planning, risk analysis, and decision-making responsibilities.

The AOM chapter titled "Pilot Responsibility and Authority" included a section titled "Preflight Requirements" (Section 6.02). The section stated, in part, "in preparation for every flight, pilots will evaluate aircraft performance, route of flight information, and weather conditions in the context of their own abilities and experience and base mission decisions on a totality of the information available to them." Further, this section stated that "the PIC is responsible for the safe operation of the aircraft and is the ultimate decision maker with regard to the conduct of the flight. All DPS pilots are authorized and expected to cancel or modify an operation which they consider inadvisable because of weather, equipment, payload, flight limitations, duty limitations, or any other factor considered to create an unsafe condition."

The aircraft section commander said that the "ultimate responsibility" to go or not to go on a flight rested with the pilot. He said that he believed the "trooper pilots…feel compelled to go, almost no matter what" and that he had told the pilots during seminars and other discussions, "if you don't feel like going, for whatever your reasons, maybe it's below minimums for weather, or other conditions…then don't go on the flight." He said that during his 25-year career with DPS he had never seen any pushback from a supervisor to a pilot for a decision not to go on a flight.

The commander said that the pilot did not normally call him when he launched on a SAR mission and that many times, if a launch occurred on the weekend, he would not know until the following Monday when he came to work that there had been a flight. The pilot did not need to obtain his permission to fly because he did not have control over Helo-1. He explained that Helo-1 was an AST asset and that the "go to person" for requesting Helo-1 was the AST SAR coordinator.

The AST SAR coordinator, who was not a pilot, confirmed that Helo-1 was an AST asset and explained that his job was to act as a central point of contact for everything having to do with the resources that a trooper needed to conduct a SAR operation including aircraft, equipment, and volunteers. His normal procedure when he received a request for assistance from a trooper was to evaluate whether Helo-1 would be the best tool for the job. If that was the case, he would call the pilot and ask him to evaluate the weather, the location, and other factors and determine whether he could go or not. He said that he relied on the pilot to determine whether or

not he could safely accept the mission and that "there was absolutely no pressure whatsoever" on the pilot to accept a mission. He said that, at the time of the accident, he and two other people were taking turns as the on call SAR coordinator after hours and on weekends and holidays. He was not on call the night of the accident, so another SAR coordinator, who was a fixed wing pilot but not a helicopter pilot, took the call from the trooper.

The recently retired aircraft section supervisor said that she could recall only one occasion when an aircraft section pilot (not the accident pilot) was pressured to fly. Shortly after she started work for the section, this pilot was asked to fly a Cessna 208 to Kodiak Island and pick up some people. After checking the weather, he informed her that the weather was not good and he did not want to go. When she informed the colonel (Commander of AWT), the response was that the pilot needed to "get in the plane and go." The supervisor said that she was shocked and felt that this direct pressure was "very inappropriate." When she informed the pilot of the colonel's response, the pilot went ahead with the mission, which was accomplished without incident.

5.3.2 Flight and Duty Time Policies

The AOM chapter titled "Pilot Qualifications and Training" included a section titled "Pilot Flight and Duty Time Limitations" (Section 6.06). The section established "reasonable maximum combinations of duty period, flight time, and rest periods allowable in a single 24 hour day," and it included definitions of duty period, flight time, and rest period. For a single pilot, the section limited the maximum duty period to 12 hours, the maximum flight time within the duty period to 8 hours, and the rest period to 10 hours. During emergencies, which included SAR operations, an extension of the maximum duty period to 15 hours, the maximum flight time within the duty period to 10 hours, and the rest period to 12 hours was allowed with "the approval of a DPS supervisor who is or has been a pilot and who can assess the need as well as the pilot's personal condition at the time." The AOM defined a rest period as "that portion of a 24 hour period beginning at midnight and ending 24 hours later at midnight the following night when a person is free of all responsibility for work or duty. Whenever possible, this period should be a continuous period during which a pilot can sleep if desired."

The recently retired aircraft section supervisor said that the section's flight and duty time policy was "based roughly" on Part 135 rules. She said that the pilots tracked their own time and that they were "very good" about tracking it. When she first started, the pilot called her a couple of times to let her know that he was going to exceed his duty time limit but then he stopped, and she believed he was instead calling the colonel (Director of AWT). Because he was not calling her, she was unsure of exactly how often the pilot was exceeding his duty time limit, but she thought it was "every couple [of] months." The supervisor said that she knew the pilot was watching his duty and rest time because sometimes he would come in to the office later than his normal time, and he would say that he had flown late the night before.

The aircraft section commander was unfamiliar with the details of the section's flight and duty time policy. When asked whether the AST SAR coordinator monitored the pilot's flight and duty time, he said "no" and added that "we leave almost all of that up to the pilot to know to follow." He said that the pilot was familiar with the policy because he had brought the limits to

his attention on several occasions. While on a mission, the pilot would reach the limit, call and tell him he had run out of duty time and ask if he could fly one more hour to get home, and the section commander would approve it as long as the pilot was not transporting anyone else. He said the pilot was "quite aware of the policy," and he followed it.

5.3.3 Weather Minimums

The AOM did not specify any weather minimums for the operation of DPS aircraft. The AOM chapter titled "Pilot Responsibility and Authority" included a section titled "In-flight Requirements" (Section 6.04) that stated, in part:

> Pilots are individually responsible for compliance with applicable Federal Aviation Regulations, particularly FAR Parts 61, 91, and in some circumstances applicable portions of Part 135. Some DPS flight operations may be operated under an FAA Certificate of Waiver, Minimum Safe Altitudes, when current and in force, as well as operating as public aircraft when the need exists and the flight meets all of the requirements. Under these types of flight circumstances, pilots remain responsible for understanding the regulations that continue to apply and for safe operation at all times.

Regarding night operations, the section on pilot responsibility and authority stated that single-engine aircraft must operate "under VFR" requirements; aircraft flown at night must be equipped with instruments and avionics that "meet IFR requirements;" and pilots must be instrument rated in the appropriate class of aircraft.

The recently retired aircraft section supervisor said that the weather minimums applicable to the pilot flying Helo-1 were the federal regulations, and she believed that under Part 91, "it was just clear of clouds for helicopters."[46] Although she did not know specifics, she believed that the pilot had personal minimums because there were times when a SAR mission would be on hold due to low ceilings or freezing rain.

The aircraft section commander said that there would be limitations established for a low experience pilot until that pilot "gets to a point where there's not much room left to…teach them something else or to provide them with any more guidance." At that point, the pilot was expected "to make those decisions to whether you go or don't go, as well as then flying within the limitations set under the FARs." He said the pilot was "certainly at that point where there wasn't anybody…more qualified to provide direction for him."

In an email (Attachment 36) from his DPS email account to a trooper pilot that was courtesy copied to the former aircraft section commander titled "Re: Night VFR" and dated December 2, 2009, the pilot wrote "I always use NVGs for night flight and I use a personal limit of 200 ft. ceiling and 5 miles. Please note 7.06 NVG Operational Limitations, dated 3/12/07,

[46] FAR 91.155 (b) (1) states that, in Class G airspace below 1,200 feet above the surface, "a helicopter may be operated clear of clouds if operated at a speed that allows the pilot adequate opportunity to see any air traffic or obstruction in time to avoid a collision."

gives no specific limitation other than slowing down for the weather condition during the flight. In addition, you must have sufficient ambient light (lums) to continue with flight."[47]

5.3.4 Preflight Risk Assessment

The AOM did not include a preflight risk assessment procedure.

The recently retired aircraft section supervisor said that she was in the initial stages of developing a risk assessment procedure for the section when she retired. She had obtained a form that looked like it could be modified to meet their needs, and she had discussed with the aircraft section commander trying it out with the aircraft section pilots.

The aircraft section commander said that the section was starting to implement a risk assessment form but that, so far, only one trooper pilot who was showing poor judgment was required to use it.

5.3.5 Pilot Training

The AOM chapter titled "Pilot Qualifications and Training" included a section titled "AS-350 Training and Currency Requirements" (Section 5.24 B). The section stated, "AS-350 pilots shall receive initial ground and flight training from American Eurocopter. Recurrent training shall be accomplished annually. A factory recurrent training course shall be attended every two (2) years." In the section of the chapter titled "Pilot Currency and Checking" (Section 5.15 A), the items to be included in annual recurrent training and checking were listed as follows:

1. A comprehensive oral examination.
2. At least one training flight with a DPS instructor or check airman.
3. At least one flight with a DPS instructor or check airman dedicated to evaluation.

The aircraft section commander said that he was not involved in determining what kind of training the pilots needed, such as flight reviews or recurrent training, and that this was handled by the aircraft section supervisor until she retired. He said that the pilot would bring it to his attention if he needed to go to training. Just before the accident, the pilot had told him that he was due for his flight review, and the commander had told him to go ahead and schedule it. The aircraft section commander said that he and the pilot had never discussed inadvertent IMC training or instrument currency. The pilot had never requested this type of training. After the accident, he learned that the former relief pilot for Helo-1 had provided inadvertent IMC training to the pilot "years ago."

The recently retired aircraft section supervisor said that she had never discussed inadvertent IMC training with the pilot. She believed it was included in the training the pilot received at Eurocopter. She said that the DPS did not have an NVG training program, that "they just followed the FARs on currency" and sent the pilot to Eurocopter for an annual check ride.

[47] The personal minimums stated by the pilot in this email differ from the minimums (500 foot ceiling and 2 miles visibility) listed on the pilot's DPS Flight Authorizations/Limitations form dated December 18, 2003.

The former relief pilot for Helo-1 said that the DPS did not have a formal NVG training program and that the pilot was the only person he had "ever qualified within the department to fly goggles and that was based on his previous military NVG qualification."

5.3.6 Tactical Flight Officer Program

The aircraft section did not have designated tactical flight officers or a tactical flight officer training program.

The aircraft section commander said that he did not interact with any of the volunteers who flew with the pilot in Helo-1. He said that he had no involvement in their training, which would fall under the responsibilities of the AST SAR coordinator.

The AST SAR coordinator said that he was not aware of a specific program to train volunteers to act as tactical flight officers/observers that would ride along in Helo-1 and assist the pilot. He was aware that there were a couple of members of AMRG that rode in the helicopter frequently as observers. He said that the pilot would contact them directly if he wanted one of them to accompany him on a SAR mission.

The former AST SAR coordinator said that the pilot, with his approval, had developed a tactical flight officer training program. The pilot had a safety concern about dividing his attention between flying the helicopter and scanning for a missing person. The plan was to train six to eight volunteers as observers on the helicopter and then they would fly on a rotational basis so there would always be someone available that was qualified to fly in the left front seat. The volunteers would be checked out on the NVGs, the forward looking infrared, the spotlight, and the Avalex mapping display and this would allow the pilot to focus on flying while the volunteer managed this equipment and scanned for the missing person. One of the volunteers was the primary observer who was used probably 80 percent of the time.

The former AST SAR coordinator said that he had heard that since he retired in 2011, the DPS was trying to put a trooper up front instead of a trained volunteer observer. He thought this was because on a lot of the calls there would be a trooper there anyway and adding a volunteer observer up front used up a significant part of the helicopter's available load carrying capacity. He said that they may not have considered the negative impact of replacing a trained observer with a trooper who was not trained in using NVGs or the other equipment installed in the helicopter. He said that a properly trained observer could assist the pilot during a night flight in marginal weather by "monitoring the terrain and the environmental factors," which a trooper with no NVGs would not be able to do.

5.3.7 Night Vision Goggle Use

The AOM included a chapter titled "Night Vision Goggle Operations," which included sections on NVG use, NVG care and operation, NVG pilot qualifications, minimum crew with NVGs, NVG currency, NVG operational limitations, NVG flight planning, and NVG preventative maintenance. The section on NVG use (Section 7.01) stated , in part, that "NVGs may only be used in piloting DPS aircraft under public aircraft rules. Pilots qualified to use

NVGs must be constantly aware of whether or not the mission they are flying and the personnel on board allow the flight to qualify to be operated under public aircraft rules." This section listed "helicopter use in search and rescue missions where there is an immediate threat to life and there is a possibility that a person can be located during hours of darkness" as one of the mission types where NVG use was authorized. The NVG pilot qualifications section (Section 7.03) stated:

A. All crew members acting as pilot must have successfully completed an initial formal NVG training course by the manufacturer's authorized agent or completed a military or government training course in the use of night vision goggles.
B. All pilots using NVGs must hold an instrument rating.
C. Crew members not rated in the aircraft but acting in the capacity of SIC or observer must have completed the care and operation training described in this chapter and be given an in-flight demonstration of operating techniques of the NVGs prior to conducting any operational missions. This instruction is to be taught be personnel who have completed a manufacturer's authorized training course.

The section on minimum crew with NVGs (Section 7.04) stated, in part, "when practical, all DPS flights operated using NVGs should use a second NVG qualified observer to assist in obstacle avoidance and with mission needs." The section on NVG currency (Section 7.05) specified the recent experience required to carry passengers and to act as pilot-in-command, and it stated that "NVG pilots will complete an NVG evaluation at least once annually." The section on NVG operational limitations (Section 7.06) stated, in part, "pilots must be constantly aware that NVGs can see through light obscurations such as light fog, haze, or smoke making it easy to inadvertently enter IMC (Instrument Meteorological Conditions) during NVG flight." The NVG flight planning section (Section 7.07) stated that "the PIC will conduct a comprehensive flight mission planning session prior to any NVG flight," and it included a list of nine items that must be covered in pre-flight planning. The first item in the list was "weather conditions – inadvertent IMC procedure."

The relief pilot said that, during his flights in Helo-1 with the pilot, they did not do any instrument flying. They talked about things that could happen including going inadvertent IMC. He said that they would do everything that they could to avoid going inadvertent IMC. If it did happen, he said the procedure was to go to a wings-level attitude, add power, and climb to a safe altitude.

The former relief pilot stated that during the NVG training he gave the pilot, he had the pilot practice inadvertent IMC recovery procedures "as far as the climb on the instruments, and then the night vision goggles up and on the instruments, but as far as actually putting a hood on him and making him fly back into recovery, no, I don't recall doing that with him." He said that the inadvertent IMC procedure was to go to the instruments, start a climb, and flip the goggles up because, at that point, they are no longer useful.

5.4 Safety Program

5.4.1 Medallion Foundation Program Participation

The Alaska DPS Aircraft Section was a member of the Medallion Foundation and was participating in the Foundation's Five Star/Shield Program. The DPS received the Safety Star in January 2012 and completed the 6-month audit for this star in July 2012 (Attachment 37). For information about the Medallion Foundation, see Section 6.1 of this report.

In order to receive the Safety Star, the Medallion Foundation required the DPS to have a safety program that addressed the following areas:

- A person identified in writing who had ultimate authority for the Safety Star program
- A person identified in writing who had responsibility for the Safety Star program
- A published written policy statement from the highest level of management which included the goals and objectives of the safety program
- A designated part time or full time director of safety position autonomous and separate from other departments reporting directly to the CEO
- A non-punitive and anonymous safety reporting system which included a hazard identification and risk assessment program
- An incident/accident reporting and investigation system
- An information tracking system
- A program for safety audits and inspections
- A method for trend analysis and reporting
- TapRooT root cause analysis program implementation
- An emergency response plan
- Consistent procedures in all manuals
- An information distribution system which provided a timely free-flow of safety-related information
- At least one safety committee
- Attendance by the safety officer at the Foundation's system safety, TapRooT and safety officer courses

The aircraft section commander had two large binders labeled "Medallion Foundation" in his office that he said had been prepared by the recently retired aircraft section supervisor. Review of the binders revealed that they contained sections covering the following topics:

- Medallion Foundation membership documentation
- Safety hazard report forms
- Safety committee meeting minutes
- Safety committee meeting minutes emails
- Safety information disseminated to DPS pilots
- Safety program information tracking system
- Monthly employee safety meeting emails
- Year-end trend analysis of reported safety hazards
- TapRooT analyses done on DPS accidents/incidents

- Emergency response plan exercise documentation
- Employee training documents
- Email notifications of receipt of safety hazard reports
- Emergency response plan documents
- Safety plan reviews documents
- Safety plan audits documents

The recently retired aircraft section supervisor said that she was asked to get the DPS involved with the Medallion Foundation. She explained that she was familiar with the Foundation and its star program because, before joining the DPS, she had flown for an air taxi operator in Alaska that had earned all five stars and was a shield carrier. She said that she felt like the DPS needed the safety program first so she started with the Safety Star although "everyone" said that was the "toughest one." It took about 2 years to achieve the Safety Star, and, at the time she retired, she had started working on the CFIT Avoidance Star and the Maintenance and Ground Handling Star. When she left, the responsibility for running the safety program passed to the aircraft section commander, and she assumed that he would continue the program as well as pursuing the CFIT and maintenance stars. At the time she retired, there were two safety meetings held each month, the safety committee meeting and a monthly employee safety meeting for the aircraft section employees. Additionally, she was emailing the meeting minutes to all the DPS pilots and posting them on the DPS intranet so anyone in the organization could view them.

She recalled that the safety reporting program started in 2010. She developed a safety hazard report form that was placed on the DPS intranet so that it was accessible to any DPS employee. The form was not just for aviation safety issues; anyone could submit the form for any type of safety issue. Once a month the safety committee would meet, discuss the safety hazard reports that had been filed, and determine how to resolve the reported hazards. Each month, the supervisor emailed the minutes of the safety committee meeting to all DPS employees. After a few months, the director of administrative services sent her an email copied to the commissioner, the colonel, and other high level officials that said "who is this safety committee and what are they, what is their authority and what are they doing." The supervisor said that this was because some of the hazards that were being reported were things that were going to require some funding to fix. After this email, the colonel told her to send the meeting minutes only to the pilots so they were no longer sent to all DPS employees.

The section supervisor said that she did not feel like the trooper pilots really participated in the safety program. There were very few safety hazard report forms completed by the trooper pilots, maybe a couple since the program started. She said that some aircraft section employees, including the pilot who was a member of the safety committee, were very active in the program. She said that occasionally trooper pilots would email her with comments on the safety committee meeting minutes that they received. She said that her opinion was that the trooper pilots did not see the value in participating and that they would participate only if they were directed to do so by their supervisors.

The supervisor said that there was a lack of visible high-level support for the safety program. One example of this was that no one from the department accompanied her to a dinner

given by the Medallion Foundation in 2012 at which all the operators who had earned a star that year were recognized. The section received two tickets, and she invited first the colonel, second the aircraft section commander, and third the maintenance shop foreman, but none of them wanted to go with her. She went by herself, and the governor and the head of the FAA's Alaska Region were there. She said that Alaska DPS was the only operator who had only one person there, and that the CEOs of the other operators were there. She said that the lack of interest in participation from the chain of command showed her that they "didn't seem to think it was that big a deal."

5.4.2 Safety Policy

There was a safety policy statement hanging in the aircraft section hangar, signed by the colonel who was the director of AWT on December 21, 2011, (Attachment 38) which stated, in part:

- Safety is fundamental to the successful performance of all tasks;
- Safety is a management function given priority at all times;
- Direct responsibility for the safety of an operation rests with the supervisor of that operation;
- Individual employees are directly responsible for the performance of their duties of which primary concern is for their own safety and for that of their fellow employees, and for the property entrusted to their care; and
- Management, at all times, will provide immediate corrective action to eliminate unsafe acts, conditions, equipment, or mechanical hazards.

> The underlying thrust of our Safety Policy is therefore directed at personal responsibility and accountability [emphasis in original].

Additionally, the safety policy statement included the following description of the aircraft section's aviation safety program:

> The Aviation Safety Program includes all aspects of Aircraft Section's operations: flight operations, ground operations, maintenance operations, and administrative support.
>
> At Aircraft Section we consistently review our operations to achieve best operational practices. Many years of operational practice have allowed us to develop an extensive operations and procedures manual.
>
> A safety manager who is experienced in safety programs will be appointed and will have the responsibility and authority to manage the DPS aviation safety program. The safety manager should be contacted in regards to any questions or recommendations.

A memorandum dated December 23, 2011, from the lieutenant who was the commander of the aircraft section to all DPS pilots, announced the appointment of the aircraft section supervisor "as the person responsible for the implementation of the Department's Aviation Safety Program."

In the chapter of the AOM titled "Aircraft Section Policies," there was a section titled "Safety Policy" (Section 3.04) that stated, in part:

A. The DPS mission entails certain inherent risks. These risks must be recognized , managed and minimized. Damage to aircraft and equipment, and injury to personnel, has a human cost and reduces the ability of DPS to perform its mission. Accidents are costly, reduce efficiency, and take aircraft and personnel out of service. They cannot be afforded, are not acceptable, and are not simply "the cost of doing business."
B. Pilot, passenger, and aircraft safety must remain a consistent and fundamental consideration in all department piloting decisions and operations. It must also be understood that the public's safety may cause these pilot and safety considerations to take second priority in the most serious of circumstances. With our public protection mandate comes a higher expectation and complexity of service that can force DPS pilots to place themselves and their aircraft at risk to safeguard the lives of the public we serve. Preparing and managing DPS pilots to properly evaluate these responsibilities and risks is critical to the success of the department's mission and its aviation program.
C. Risk evaluation decisions are not to be taken lightly. Increased risk decisions must be made in consultation with another experienced DPS pilot or the pilot's supervisor unless an immediate threat to public safety exists and there is no viable means of communication. The decisions that a pilot and the pilot's chain of command make will be evaluated carefully whenever an event or mishap occurs. The purpose of the evaluation and review will be to ensure that errors are identified, corrected, and that lessons learned are shared and used to improve the DPS aviation program.

5.4.3 Safety Management

When asked if the aircraft section had a safety officer and a safety policy, the colonel replied that the recently retired aircraft section supervisor "ran everything." He recalled getting weekly safety reports and said this was a result of joining the Medallion Foundation. He said that the DPS had joined the Medallion Foundation about 2 to 3 years before in an effort to improve safety because they had a number of "small accidents" and the state legislature was asking why the accidents were happening. He said that the retired aircraft section supervisor was responsible for the department's participation in the Medallion Foundation and that they had received the first star and were working on the second and third stars. When asked what the first star entailed, the colonel said, "as a result of the first star, I remember these safety meetings coming about. I think the second and third stars are more maintenance. Offhand, I don't know."

The aircraft section commander said that the higher level manager accountable for safety was the colonel and that policy came from the colonel. He said that the recently retired aircraft section supervisor was responsible for the section's participation in the Medallion Foundation and its earning the Safety Star. He said he believed she was directed to participate in the star program by the colonel but that it might have come from the commissioner. He recalled meeting with the colonel, the commissioner, the supervisor, and representatives from the Medallion Foundation to talk about the department's participation in the star program. He said the meeting was prompted by a need to brief the commissioner before he met with the state legislative

committee that reviewed the department's budget request so that the commissioner would be prepared to answer the committee's questions about what the DPS was doing to reduce accidents. When the supervisor retired, responsibility for managing the safety program fell to him. He admitted that since her departure, he "had not been able to keep up with all that stuff."

5.5 Alaska DPS Aircraft Accident History

A review of the NTSB accident database revealed 18 accidents involving aircraft owned and operated by the Alaska DPS between July 1, 1999, and June 30, 2013 (fiscal years 2000 to 2013). See Attachment 39 for a list of these accidents.

Two of the accidents resulted in a total of 4 fatalities; one is the subject of this report, and the other was a Piper PA-18-150 that impacted terrain in an uncontrolled descent following a loss of engine power on takeoff near King Salmon, Alaska, on June 25, 2001. The trooper pilot, the sole occupant, was killed. The NTSB determined that the probable cause of the accident was "the pilot's selection of the incorrect fuel tank, subsequent fuel starvation, and inadvertent stall during initial climb. Factors associated with the accident were inadequate transition training, and insufficient training standards of the operator/management."

Four of the accidents involved helicopters. One of the helicopter accidents is the subject of this report, and one was the pilot's 2006 accident in Helo-1, which was described in Section 2.2.4 of this report. The other two accidents involved Robinson R-44 helicopters. One of these accidents occurred near Chickaloon, Alaska, on February 4, 2001. The helicopter was on a SAR mission with the purpose of delivering two volunteers and their equipment to the scene of an avalanche. The pilot, who was the supervisor of the aircraft section at that time, reported that he was approaching the snow-covered landing site in flat light conditions when the low rotor rpm warning horn sounded. He initiated a go-around; however the helicopter continued to descend and impacted the terrain. The helicopter sustained substantial damage, and the pilot and his two passengers were not injured. The NTSB determined that the probable cause of the accident was "the pilot's collision with terrain due to his inadequate planning of the approach, and his failure to maintain the helicopter's main rotor rpm during a go-around. Factors in the accident were a tailwind, flat light conditions, and snow-covered terrain."

The other R-44 accident occurred near Iliamna, Alaska, on May 12, 2009. The helicopter was on a game management patrol when the pilot felt an unusual vibration that rapidly turned to oscillations in both yaw and pitch. The pilot initiated an emergency landing, and the helicopter landed hard sustaining substantial damage. The pilot and his two passengers were not injured. The NTSB determined that the probable cause of the accident was "the main rotor transmission mount design, which resulted in an in-flight vibration/oscillation, and damage to the helicopter during an emergency descent and hard landing. Contributing to the accident was the lack of information from the manufacturer regarding this known flight oscillation, and loading the helicopter beyond the forward center of gravity limit by the pilot."

The number of accidents and the total hours flown by all DPS aircraft in each fiscal year from 2000 to 2013 are listed in Table 6. The total hours flown in each fiscal year were obtained from budget reports available online at http://omb.alaska.gov (Attachment 40).

Table 6. Alaska DPS Accidents and Total Flight Time For Fiscal Years 2000 to 2013

Fiscal Year	Hours Flown	Number of Accidents
FY2000	8,923	1
FY2001	9,220	3
FY2002	8,267	1
FY2003	8,633	0
FY2004	7,402	1
FY2005	7,109	1
FY2006	7,170	1
FY2007	7,170	0
FY2008	5,601	2
FY2009	6,781	4
FY2010	7,143	1
FY2011	7,147	0
FY2012	6,003	2
FY2013	6,298	1
Totals	**102,867**	**18**

5.6 Airborne Law Enforcement Association Membership

When asked about the aircraft section's involvement in the Airborne Law Enforcement Association (ALEA), the aircraft section commander said that he did not know the organization existed until a year ago.[48] He said that the recently retired aircraft section supervisor had been a member and that she had sometimes forwarded safety information she received from ALEA to the trooper pilots. Since she retired, he had joined ALEA and reviewed the information they made available online. He said that, although there was "quite a bit of data there," he was "a little disappointed that a lot of that was just in generalities." He explained that the best practices included developing a safety policy and implementing risk assessment, but there were no examples of actual policies or risk assessment sheets.

The recently retired aircraft section supervisor said that she had obtained a membership in ALEA for the section, but there was no participation by section personnel in any of the organization's meetings or seminars. She said that she received a monthly safety newsletter from ALEA, which she emailed to all the pilots because it had information in it applicable to the kinds of flying the trooper pilots were doing.

[48] ALEA was founded in 1968 as a non-profit association composed of local, state, and other public aircraft operators engaged in law enforcement activities. The organization's stated mission is to support, promote, and advance the safe and effective utilization of aircraft by governmental agencies through training, networking, advocacy, and educational programs.

5.7 Awareness of 2009 New Mexico State Police Accident[49]

The recently retired aircraft supervisor and the aircraft section commander both said that they were not aware of the 2009 New Mexico State Police (NMSP) accident until after this accident. The commander said that he learned about the accident at a Medallion Foundation meeting, and he then read the NTSB report. He said the NMSP accident was "nearly identical" to this accident. The supervisor said that she learned about the NMSP accident from the former relief pilot and that she then read the NTSB report. She said that she wished she had read the report before she retired and that she thought the recommendations made by the NTSB were applicable to the Alaska DPS.

6.0 Additional Information

6.1 Medallion Foundation

The Medallion Foundation was formed by the Alaska Air Carriers Association in 2001 as a non-profit organization for the purposes of improving pilot safety awareness and reducing air carrier insurance rates. The organization's stated 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 has established multiple programs including the Five Star/Shield Program for aircraft operators, described as "a step-by-step approach to building a safety management system by providing program and process guidelines, specific training classes, one-on-one company mentoring and auditing to determine if the applicant meets the specific program requirements." The five Stars included CFIT Avoidance, Operational Control, Maintenance and Ground Service, Safety, and Internal Evaluation. An operator participating in the program must satisfy specific requirements to earn each Star. For example, to earn the Safety Star, an operator is required to have implemented a safety program with commitment from top management that includes a non-punitive and anonymous safety reporting system, an emergency response plan, a safety committee, and a viable safety information collection and distribution system.

An operator enrolling in the Five Star/Shield Program is assigned a Medallion Foundation program manager who assists the operator in completing the requirements for each Star. When the program manager determines that the operator has met the requirements for a specific Star, a Medallion Foundation evaluator completes an audit of the operator, and, if the results are satisfactory, the operator is awarded that Star. The operator is initially re-evaluated after holding a Star for 6 months and then recurrent audits are performed every 12 months. Once all five Stars have been awarded, the operator is eligible for the Shield. To receive the Shield, the operator must pass an audit that focuses on determining whether the applicant has incorporated the concepts associated with the Stars into its organizational culture.

[49] See *Crash After Encounter with Instrument Meteorological Conditions During Takeoff from Remote Landing Site, New Mexico State Police Augusta S.p.A. A-109E, N606SP, Santa Fe, New Mexico, June 9, 2009*, Aircraft Accident Report NTSB/AAR-11/04 (Washington, DC: National Transportation Safety Board, 2011), which can be found at www.ntsb.gov/investigations/reports_aviation.html

6.2 FAA-Established NVG Weather Minimums

The FAA has established NVG weather minimums for helicopter emergency medical service (HEMS) operations conducted under FAR Part 135. These minimums are a part of Operations Specification (OpSpec) A021, which authorizes an operator to conduct HEMS operations (Attachment 41). The minimums range from a ceiling of 800 feet agl and a visibility of 3 miles for a local flight in non-mountainous terrain to a ceiling of 1,000 feet agl and a visibility of 5 miles for a cross country flight in mountainous terrain.

6.3 SAR Responsibility in the State of Alaska

With the exception of lands under the control of the National Park Service (NPS), overall responsibility to provide SAR operations on land within the state of Alaska belongs to AST, pursuant to Alaska Statute 18.60.120. The U.S. Coast Guard Rescue Coordination Center (RCC) in Juneau, Alaska, is responsible for SARs at sea, and the Alaska Air National Guard RCC at Joint Base Elemendorf/Richardson near Anchorage is responsible for SARs involving missing or downed aircraft. NPS is responsible for SARs occurring on NPS lands.

The section of the "State of Alaska, FY2014 Governor's Operating Budget" document (Attachment 42) that discussed SAR operations stated that in fiscal year 2012, the DPS responded to 676 incidents of which 305 resulted in a SAR, and a total of 498 persons were rescued or recovered during these operations. The document gave the following breakdown of the cases investigated:

- 35 aircraft related cases investigated
- 45 overdue hiker cases investigated
- 106 overdue boater cases investigated
- 81 overdue motorist cases investigated
- 104 overdue snow machine cases investigated

F. LIST OF ATTACHMENTS

Attachment 1: List of persons interviewed
Attachment 2: Timeline of key events and communications on March 30, 2013
Attachment 3: Snowmobiler's cellular telephone records
Attachment 4: Pilot's notepad excerpt
Attachment 5: Pilot's SAR reports for 6 months before the accident
Attachment 6: Pilot's resume given to DPS at time of hire
Attachment 7: Pilot's military records (provided by next of kin)
Attachment 8: Pilot's performance evaluation excerpts
Attachment 9: Pilot's messages of appreciation excerpts
Attachment 10: Pilot's commendations excerpts
Attachment 11: Pilot's training and check flights from 2001 to 2013
Attachment 12: Quote from Aviation Specialties Unlimited for NVG training
Attachment 13: Pilot's logbook excerpts
Attachment 14: Pilot's flight time with DPS
Attachment 15A: Helicopter log sheets for 6 months before the accident

Attachment 15B: Pilot's NVG currency form dated March 15, 2013
Attachment 16: DPS memorandum on internal investigation of 2006 Helo-1 accident
Attachment 17: DPS memorandum of warning to pilot following 2006 accident
Attachment 18: DPS report on 2009 over speed incident
Attachment 19: Turbomeca information about 2009 over speed incident
Attachment 20: Eurocopter information about 2009 over speed incident
Attachment 21: Pilot's statement about 2011 over torque incident
Attachment 22: DPS memorandum addressing 2011 over torque incident
Attachment 23: Pilot's time sheet for March 16-31, 2013
Attachment 24: Pilot's pay record for calendar year 2012
Attachment 25: DPS memorandums concerning pilot discussions with lead mechanic
Attachment 26: Form 337 showing installation of attitude indicator
Attachment 27: Excerpts from attitude indicator installation manual
Attachment 28: TSO-C4c Bank and Pitch Instruments
Attachment 29: Turn and bank indicator discrepancy documentation from 2004
Attachment 30: Weight and balance calculation
Attachment 31: NVG inspection record dated March 22, 2013
Attachment 32: Pilot's toxicology report
Attachment 33: FY2014 Governor's Operating Budget excerpts related to aircraft section
Attachment 34: Aircraft section budget FY 2010 to 2013
Attachment 35: DPS Aircraft Operating Manual excerpts
Attachment 36: Pilot's 2009 email concerning NVG weather minimums
Attachment 37: Medallion Foundation program information
Attachment 38: DPS safety policy statement
Attachment 39: DPS aircraft accident history
Attachment 40: DPS flight time by fiscal year from 2000 to 2013
Attachment 41: FAA Operations Specification A021
Attachment 42: FY2014 Governor's Operating Budget excerpts related to SAR