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

Air Transportation Safety Investigation Report A20P0080

COLLISION WITH TERRAIN

Aberdeen Helicopters Ltd.
Airbus Helicopters AS 350 B2 (helicopter), C-FAHC
Stewart, British Columbia, 45 NM NNW
17 August 2020

History of the flight

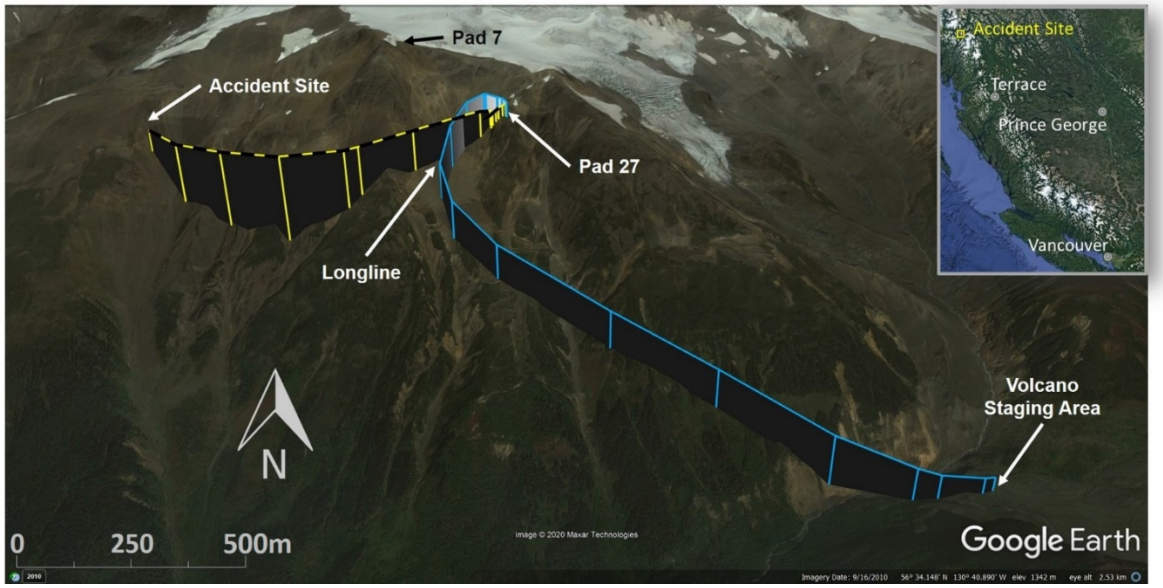
On 17 August 2020, the Aberdeen Helicopters Ltd. (Aberdeen) Airbus Helicopters AS 350 B2 helicopter (registration C-FAHC, serial number 2898) was conducting visual flight rules (VFR) operations in support of a mineral exploration project. The pilot's tasks began at 0652[1] with flying the day shift crew to their drill sites on Nickel Mountain, British Columbia (BC), and returning the night shift crew to Garibaldi Camp located 9 nautical miles (NM) northwest of the drilling area. The pilot then picked up 2 workers from the camp, dropped them off on the mountain, and, at approximately 0750, landed at a location known as the Volcano staging area, approximately 1 NM southeast of the drilling site at Pad 27 (Figure 1).

As the sole occupant, the pilot removed the helicopter's external storage basket, fuelled the aircraft, and attached a 75-foot longline in preparation for the next task, moving a dismantled drill rig from Pad 27 to Pad 7, approximately 1400 feet to the northwest. The first set of lifts between the pads began at approximately 0800 and continued until approximately 0842, when the pilot returned to the Volcano staging area to refuel.

The pilot returned to Pad 27 at approximately 0854 to resume the longline operation to move the drill rig. During one of the 11 lifts, the pilot communicated that he would have to hover in place due to reduced visibility before he could continue with the lift. The visibility improved and the rig transfer continued. At approximately 1006, the pilot returned to the Volcano staging area to refuel.

[1] All times are Pacific Daylight Time (Coordinated Universal Time minus 7 hours).

Figure 1. View of Nickel Mountain with the global positioning system track of the helicopter's path before its final arrival at Pad 27 (solid line) and shortly before the accident (dashed line) (Source: Google Earth, with TSB annotations)



At 1022, the pilot returned to Pad 27 to move the last piece of the drill rig. After the drill foreman had hooked the load up to the helicopter's longline, the pilot communicated that poor weather was approaching and that he was unable to take the load. The load was disconnected and the helicopter hovered in place for approximately 1 minute. At 1024, the pilot backed away from the drill pad downslope (southwestward) at a ground speed of between 1 and 2 knots and stopped approximately 200 feet away. He then moved back toward the pad, and the drill crew asked if they should remove the longline. The pilot said it was not necessary, and at 1025:40, he turned and began to accelerate on a southwestward track. Heavy rain began at this time.

Over the next 30 seconds, global positioning system (GPS) data showed that the helicopter continued southwest and accelerated to a ground speed of approximately 70 knots at GPS altitudes of between 5600 feet above sea level (ASL) and 5500 feet ASL. At 1026:02, the pilot released the longline from the helicopter onto the hillside about 800 feet west of Pad 27 and, 9 seconds later, the helicopter began to track to the right in a turn at approximately 5° per second. The change in altitude during this turn was less than 100 feet. The turn continued until just after 1026:27, when the helicopter collided with terrain.

The pilot was fatally injured. The aircraft was destroyed in the collision and a post-impact fire.

Search efforts

When the heavy rain began, the drill crew at Pad 27 sought shelter in the survival shack at the drill site. They emerged after approximately 15 minutes and, assuming the helicopter was waiting at the Volcano staging area, attempted to contact the pilot by radio. The crew at Pad 7 also tried to contact the pilot by radio. Neither crew was successful. The drill crews began a ground search in their immediate areas and, at approximately 1111, an air search began with another Aberdeen helicopter that was in use for the exploration project. The air search focused on likely places the helicopter could

have set down to wait out poor weather conditions. After this unsuccessful initial search, the Joint Rescue Coordination Centre (JRCC) in Victoria, BC, was notified at 1236, and a search and rescue aircraft was tasked with the search at 1422.

At 1428, the pilot of the other company helicopter, who had begun a patterned search of Nickel Mountain at about 1407, informed the camp that he had located the crash site and that the crash was not survivable. At 1453, the JRCC was informed and the search and rescue aircraft was stood down.

Aircraft information

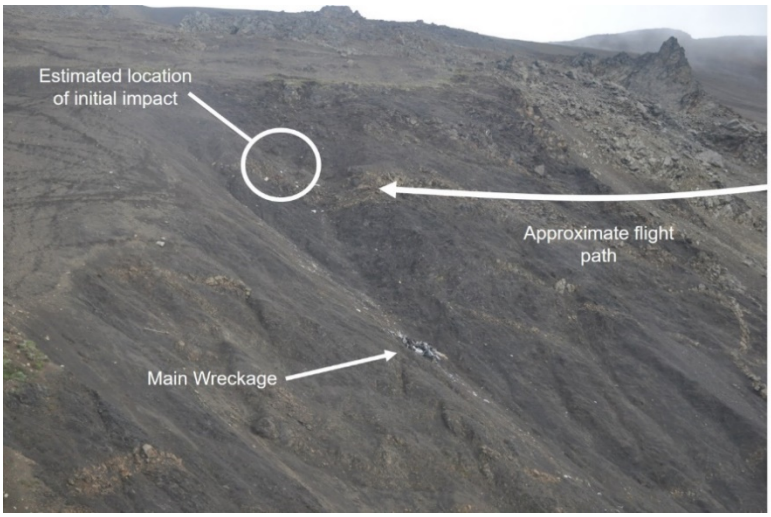
The occurrence aircraft was a Eurocopter France (now Airbus Helicopters) AS 350 B2 helicopter manufactured in 1996. It was equipped with a Honeywell LTS101-700D-2 turboshaft engine (serial number LE-46088C), installed in accordance with Soloy LLC supplemental type certificate SR01647SE. It was also equipped with an attitude indicator; there was no indication that there was a malfunction with this instrument. At the time of occurrence, the aircraft had accumulated approximately 14 215.8 hours of total air time.

Records indicate that the aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. The helicopter had no known deficiencies before the occurrence flight and was being operated within its weight and centre-of-gravity limits. The helicopter was equipped with a Kannad 406AF-Compact emergency locater transmitter (ELT). The Canadian Mission Control Centre did not receive a signal from the aircraft's 406 MHz ELT, and no signal was detected by the company's other helicopter during the search. Due to the nature of the impact and the post-impact fire, it could not be determined why no signal was transmitted.

Wreckage and impact information

The wreckage was found at approximately 5500 feet ASL on a steep mountainside (Figure 2). The damage was consistent with a high-energy impact. Most of the aircraft was consumed by the post-impact fire with the exception of the tail boom and the floorboard area of the cabin.

Figure 2. Occurrence site on 26 August 2020, looking northeast (Source: TSB, with TSB annotations)



All 3 main rotor blades remained attached to the rotor head and exhibited impact damage consistent with high rotational energy of the rotor system as well as thermal damage. Impact signatures and markings on the tail rotor and driveshaft were consistent with tail-rotor driveshaft rotation at impact. Functional continuity of the flight control system and main rotor drive system could not be determined due to the damage from impact forces, but the flight controls were traced from the flight controls and remaining linkages to the main rotor and tail rotor systems. The engine

was also damaged from impact forces, and there was fire damage to the outside accessory areas. The first stage compressor showed leading edge damage consistent with the ingestion of dirt or rocks.

Nothing was found during the post-accident examination to indicate that an airframe failure or system malfunction occurred either before or during the occurrence flight.

Pilot information

The pilot held a Canadian commercial pilot licence – helicopter, a valid Category 1 medical certificate, and was type rated for the AS 350 B2 helicopter. He had accumulated more than 2800 flight hours, including at least 900 hours on this type of helicopter and more than 200 hours on the occurrence aircraft. This was his second summer flying in the same area and supporting the same exploration company.

Aberdeen Helicopters Ltd. was authorized by Transport Canada (TC) to conduct operations with reduced VFR visibility limits of ½ SM in uncontrolled airspace and the pilot had completed the annual company VFR low visibility flight training.[2,3]

Based on a review of the pilot's work and rest schedule, fatigue was not considered a factor.

Weather information

The accident occurred in an area known for rapidly changing weather conditions. This is to be expected in a region where mountainous terrain is directly affected by moist coastal air.[4] The closest aviation weather reporting station is Stewart (CZST), BC, located 45 NM south-southeast of the accident site. The weather at 1000 was as follows: wind direction variable at 2 knots, visibility 3 statute miles (SM) in light rain and mist, broken clouds at 700 feet above ground level (AGL), overcast cloud at 6000 feet AGL, temperature and dew point 12 °C, and altimeter setting 29.87 inches of mercury.

There was some weather information available from the Eskay Creek mine camp, located 10 NM east of the accident site, but the data collected by that station was limited to relative humidity, air temperature, and a precipitation gauge. At the time of the accident, the temperature was approximately 12 °C with 100% relative humidity, and light to moderate rainfall.

The graphic area forecast, valid at 1100,[5] for the area near the accident site indicated an upper cold front moving northwestward through the area at 30 knots. The forecast included showery precipitation with visibility varying between 2 and 6 SM in light rain and mist. Overcast clouds based between 1500 and 3000 feet ASL with tops at 12 000 feet ASL were expected in the area, and patchy (between 25% and 50%) ceilings between 500 and 1000 feet AGL were also forecast. In addition, the forecast called for isolated areas (25% or less) of altocumulus castellanus clouds topped at

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2 Transport Canada, *Commercial Air Services Standard* 722.17(2).

3 Transport Canada, TP 4711, *Air Operator Certification Manual*, Volume 3 – Operations Specifications, section 5.17.3, p. 192.

4 NAV CANADA, *The Weather of British Columbia: Graphic Area Forecast 31* (2001).

5 The 1100 graphic area forecast (GFA) was issued at 1031, 5 minutes after the accident. While the 0500 GFA, issued at 0431, was valid at the time of the accident, the 1100 GFA was determined to be more indicative of the weather conditions experienced during the occurrence.

16 000 feet ASL with a visibility of 1 SM in rain showers and mist, and local (25% or less) visibilities of ½ SM in light rain and fog with cloud ceilings of 200 feet AGL.

Garibaldi Camp had internet connectivity, but it could not be determined whether the pilot had accessed online weather information before the flight. To determine current conditions, the camp routinely contacted the night crews on the mountain each morning to obtain direct weather information. On the morning of the accident, the weather was reported as clear and raining. Clear meant that the drill sites were not obscured by cloud.

Flight operations in rain

In regard to flight operations in rain, the *Transport Canada Aeronautical Information Manual* states the following:

> An error in vision can occur when flying in rain. The presence of rain on the windscreen, in addition to causing poor visibility, introduces a refraction error. This error is because of two things: firstly, the reduced transparency of the rain-covered windscreen causes the eye to see a horizon below the true one (because of the eye response to the relative brightness of the upper bright part and the lower dark part); and secondly, the shape and pattern of the ripples formed on the windscreen, particularly on sloping ones, which cause objects to appear lower. The error may be present as a result of one or other of the two causes, or of both, in which case it is cumulative and is of the order of about 5° in angle. Therefore, a hilltop or peak ½ NM ahead of an aircraft could appear to be approximately 260 ft lower, (230 ft lower at ½ SM) than it actually is.[6]

On-board recording devices

Following a fatal accident with no survivors or witnesses, an investigation may never be able to determine the exact causes and contributing factors unless the aircraft is equipped with an on-board recording device. The benefits of recorded flight data in aircraft accident investigations are well known and documented.[7] Following an occurrence[8] on 13 October 2016 in which a privately operated Cessna Citation 500 collided with the ground and fatally injured the pilot and 3 passengers, the Board recommended that

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[6] Transport Canada, TP 14371, *Transport Canada Aeronautical Information Manual* (TC AIM), AIR – Airmanship (08 October 2020), section 2.5, at https://tc.canada.ca/sites/default/files/2020-10/aim-2020-2_air-e.pdf (last accessed on 11 December 2020).

[7] TSB aviation investigation reports A01W0261, A02W0173, A03H0002, A05W0137, A05C0187, A06W0139, A07Q0063, A07W0150, A09A0036, A09P0187, A10P0244, A11P0117, A11Q0028, A11O0031, A11W0048, A11C0047, A11P0106, A11H0001, A12C0005, A12W0031, A13H0002, A14W0127, A14Q0148, A15P0081, A16A0032, A17P0170, A18P0080, A19P0176, and A19P0187.

[8] TSB Aviation Investigation Report A16P0186.

> the Department of Transport require the mandatory installation of lightweight flight recording systems by commercial operators and private operators not currently required to carry these systems.
>
> **TSB Recommendation A18-01**

In its September 2020 response to this recommendation, TC indicated that it agrees with this recommendation and that it has developed a draft Notice of Proposed Amendment to the regulation mandating the installation of lightweight data recorders in existing aircraft and their installation in newly manufactured aircraft. In its December 2020 assessment of TC's response, the TSB stated that TC's progress on the development of lightweight data recorder regulations is considered to be positive. However, until the regulations are finalized, the risks associated with the safety deficiency identified in Recommendation A18-01 will continue to exist. Therefore, the response to Recommendation A18-01 was assessed to be **Satisfactory in part**.[9]

Safety message

VFR flight in reduced visibility conditions, whether they are caused by precipitation or obscuring phenomena, is hazardous, particularly in mountainous terrain. In areas where weather changes rapidly, it is important that pilots and air operators establish operational limits and procedures to maintain visual contact with the terrain at all times.

This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 24 February 2021. It was officially released on 09 March 2021.

[9] TSB Recommendation A18-01: Mandatory installation of lightweight flight recording systems, at https://www.bst-tsb.gc.ca/eng/recommandations-recommendations/aviation/2018/rec-a1801.html (last accessed on 12 January 2021).

ABOUT THIS INVESTIGATION REPORT

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