Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

AVIATION INVESTIGATION REPORT
A09Q0111

CONTROLLED FLIGHT INTO TERRAIN

CANADIAN HELICOPTERS LIMITED
BELL 206L (HELICOPTER) C-GNLK
KANGIQSUJUAQ, QUEBEC, 36 nm SE
17 JULY 2009

Canada

Aviation Investigation Report

Controlled Flight Into Terrain

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Report Number A09Q0111

Summary

A Canadian Helicopters Limited float-equipped Bell 206L helicopter (registration C-GNLK, serial number 46601) was on a visual flight rules flight from Kangirsuk to Kangiqsujuaq, Quebec. The pilot and an aircraft maintenance engineer were on board the helicopter. Approximately 44 nautical miles from the destination, with reduced visibility and a low ceiling, the aircraft diverted from the direct route and proceeded north towards the shore of the Hudson Strait. The helicopter was flying at a low altitude and at low speed. At a little less than a mile from the coast, the aircraft traversed an arm of the sea in a valley. Within the next minute, at 1434 Eastern Daylight Time, the helicopter in controlled flight struck the north rock wall of the valley. The aircraft was destroyed by impact forces and both occupants were fatally injured. The helicopter was found six days later.

Ce rapport est également disponible en français.

Other Factual Information

Pilot Information

From 1980 to 1996, the pilot flew with the Bulgarian Air Force. During his military career, he logged about 350 flying hours on aeroplanes and 1477 flying hours on helicopters, including 325 hours in instrument flight conditions. He also had training in low-altitude flight. His résumé indicated that flying in poor visibility was one of his professional skills.

In 2001, the pilot received his Canadian commercial pilot licence. From April 2003 to June 2009, he worked mainly for Niagara Helicopters Limited, conducting sightseeing flights over Niagara Falls, Ontario. In April 2008, he received his instrument rating with Canadian Helicopters Limited (CHL). In May 2008, CHL provided him with training on pilot decision making. In 2008 and 2009, he took initial training and annual recurrent training on the procedures set out in the company operations manual for flying in reduced visibility.

From June to August 2008, he flew a Bell 206 and a Eurocopter AS 350 for CHL in the area of High Level and Fort McMurray, Alberta, where he logged about 135 flying hours. The pilot received an airline pilot – helicopter licence in February 2009.

In July 2009, he joined the CHL base in Edmonton, Alberta. A few days later, his services were required at the base in Goose Bay, Newfoundland and Labrador, for a contract on Southampton Island, Nunavut.

On 13 July 2009, CHL gave him training on the float-equipped Bell 206L. Over the following two days, he made flights in the Goose Bay area. These were his first flights on the east coast of Canada.

History of the Flight

On 16 July 2009, C-GNLK took off from Goose Bay on a flight to Coral Harbour on Southampton Island, Nunavut, with the pilot and an aircraft maintenance engineer (AME) on board. The aircraft had been chartered for a bird inventory. The contract was to run for about four weeks beginning the next day, the day of the accident. The aircraft landed at Kuujjuaq, Quebec, at 1230 [1] after stops at Churchill Falls, Newfoundland and Labrador, and Schefferville, Quebec. The flight was completed without incident. As the weather to the north was unfavourable for visual flight rules (VFR) flight, the pilot and the AME spent the night in Kuujjuaq. Given the unpredictable conditions in this region, CHL had advised the client that the aircraft might be delayed. The client understood this, the pilot was advised of that fact and there was no pressure from the company or the customer to get to the job site.

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[1] All times are Eastern Daylight Time (Coordinated Universal Time minus four hours).

On 17 July 2009, the pilot arrived at the airport around 0730. At the Kuujjuaq Flight Service Station (FSS), he obtained weather information for Kangirsuk (CYAS) and Kangiqsujuaq (CYKG). As graphic area forecast (GFA) [2] weather charts were not available, [3] he was told that a call could be placed to the Flight Information Centre (FIC) in Québec, Quebec. According to the information received, the pilot did not phone the FIC in Québec or the FIC in Halifax, Nova Scotia. He delayed his departure due to the unfavourable weather. On the ground at Kuujjuaq, he contacted the CHL Goose Bay base for an update on the weather on the planned route. It could not be determined if the pilot obtained weather information from the Internet.

When the weather conditions improved, the pilot filed a VFR flight plan with CHL Goose Bay base; a copy was then sent to NAV CANADA. The total estimated time from take-off to the landing at Coral Harbour was 9 hours, 40 minutes. Stops were planned at Kangirsuk, Kangiqsujuaq, Salluit, and Ivujivik, Quebec. The estimated time of arrival at Coral Harbour was 2100, or about 2 hours, 30 minutes before sunset.

At 1118, the aircraft took off from Kuujjuaq in VFR conditions [4] bound for Kangirsuk, 126 nautical miles (nm) to the north-northwest. At 1209, the helicopter made an unscheduled landing 26 nm from destination and remained on the ground with the engine running. Seven minutes later, the aircraft took off again for Kangirsuk, where it landed at 1256. The aircraft flew this leg at less than 100 feet above ground level (agl) at a groundspeed of about 95 mph.

On the ground at Kangirsuk, the pilot called the CHL Goose Bay base. He was informed that the weather was favourable at Kangiqsujuaq and all the way to Coral Harbour. At 1339, after refuelling, the helicopter took off for Kangiqsujuaq 109 nm further north-northwest. The aircraft was to overfly treeless terrain with elevations ranging from 400 feet above sea level (asl) to over 1500 feet asl. The aircraft followed a direct route towards its destination at a groundspeed of about 100 mph.

At 1424, when it was 44 nm from destination, the aircraft turned north and headed for the coast. The flight continued at low altitude. A few minutes later, the aircraft entered a valley leading to Hudson Strait. Groundspeed was fluctuating between 60 mph and 10 mph.

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2 The GFA consists of a series of weather charts updated over time, each describing the most probable conditions forecast below 24 000 feet in a given area at a specific time.

3 FSSs do not provide GFAs to pilots, and FSS specialists are not qualified to interpret them. The Kuujjuaq FSS has a room for pilots that is equipped with a fax machine and a direct phone line to the Québec FIC.

4 Visibility was 15 statute miles (sm) and the cloud ceiling was 3400 feet agl.

Approximately 1 sm (statute mile) from the coast, the helicopter turned left on a northwesterly heading and crossed the north wall of the valley. The aircraft continued on its route at low altitude until it had passed the ridge. The last three coordinates recorded by the onboard global positioning system (GPS) [5] indicate that the helicopter was crossing an arm of the sea a few seconds before the accident. Groundspeed was 56 to 62 mph, then 101 mph, and the corresponding altitudes were 1152 feet asl, 1060 feet asl, and 652 feet asl, respectively.

Accident Site

The accident occurred a little under 1 nm from the Hudson Strait in a coastal valley lying 36 nm southeast of Kangiqsujuaq. The valley is about 2300 feet wide and runs inland toward the west between two rocky escarpments. The elevation of the ridgeline on the south side is 1050 feet asl, and that of the north ridgeline is about 820 feet asl. The aircraft was on a northerly heading when it struck the north wall of the valley at about 700 feet asl.

Figure 1. Trajectory recorded by the global positioning system (GPS)

At the time of impact, the aircraft was in a nose-up attitude of about 30°. The collision trajectory was at an angle of about 45° to the right in relation to the valley. The aircraft was destroyed by impact forces. The main components were projected to the right of the point of impact. Several fires fed by the aircraft's fuel broke out after the collision. The accident was not survivable.

5 Garmin GPSMap 296.

Information on Seasonal Conditions and Local Effects in the Region

The terrain in Northern Quebec along Hudson Strait rises to elevations ranging from 1200 feet to over 2000 feet asl. It is studded with numerous arms and bays.

The weather conditions in Northern Quebec are largely dependent on the mountains in the region and on the large masses of salt water contained in Ungava Bay, Hudson Bay, Hudson Strait, and the Labrador Sea.

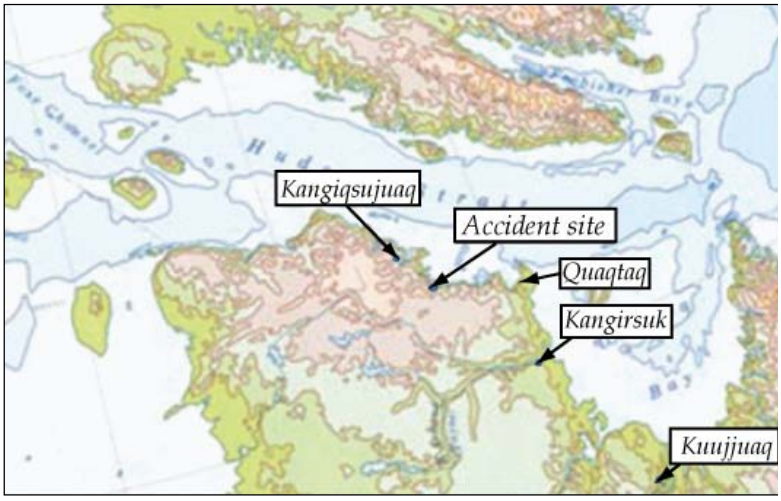

Figure 2. Map of Northern Quebec

After all the ice has disappeared, fog is the main cause of adverse conditions. The water warms up slightly, but it is still much colder than the air above it. The resulting advection fog is the cause of near-zero ceilings and visibility in coastal areas. When held in place by an inversion, this fog is slow to dissipate, even under a warm sun; the months of July and August are usually the worst for this type of condition.

CHL provides general meteorological training for its pilots. CHL does not provide specific training on the meteorological configurations that prevail in a particular region; the company is not required by present regulations to do so. While in Goose Bay, the pilot learned about flying in Eastern Canada and Nunavut mainly through conversations with co-workers and the Base Manager, who was also the Director of Flight Operations (Atlantic).

Weather Information

The surface analysis at 1400 hours [6] indicated a high-pressure system over Resolution Island to the south of Baffin Island. On the east coast of Northern Quebec, the surface wind was onshore from the northeast at 12 knots.

According to the satellite image at 1401, there was a fog bank offshore and along the coast in the area of the accident. The easterly surface wind was pushing the fog bank horizontally over the land. Advection fog forms when warm moist air moves over snow, ice, or cold water.

According to the METARs [7] and SPECIs [8] issued at Kangirsuk (CYAS), visibility was ½ statute mile (sm) in fog from 1000 to 1029, 1 sm in mist from 1029 to 1050, and 1½ sm in mist from 1050

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6 All weather times have been converted to Eastern Daylight Time.

7 Aviation routine weather reports describing weather conditions as observed from the ground at a given location and time.

8 Aviation selected special weather report following a change in meteorological parameters between routine transmission times.

to 1121. From 1121 to 1237, visibility was 10 to 15 sm with fog observed less than 5 sm from the station. From 1000 to 1237, the ceiling was 200 feet. From 1237 to 1400, conditions were VFR with visibility over 6 sm, scattered cloud from 400 to 600 feet agl with ceiling at 3000 feet agl. From 1400 to 1500, there were a few clouds at 800 and 4000 feet agl. The wind was 30° from the north-northeast at about 15 knots, gusting to 20 knots.

According to the METARs and SPECIs issued at Quaqtaq, Quebec [9] between 1000 and 1218, visibility varied from ⅛ to ½ sm in drizzle and fog and the ceiling from 200 to 300 feet agl. The wind was 60° at 8 to 11 knots. From 1218 to 1339, visibility improved to 1 sm in mist, but the ceiling lowered to 100 feet agl. The wind continued from the northeast at 10 knots. Conditions worsened again from 1218 to 1500, with visibility at between ⅜ and ⅝ sm in drizzle and fog, with ceiling at 300 to 400 feet agl. Winds were north-northeast at 30° and 10 knots.

The weather at Kangiqsujuaq (CYKG) from 1000 to 1029 was as follows: visibility 5 sm in drizzle and mist with ceiling at 200 feet agl. Winds from the southeast at 120° and 4 knots. From 1029 to 1100, visibility was 10 to 12 miles, with ceiling from 400 to 500 feet agl with southeast winds at 130° and 4 knots. The METAR from 1200 is missing. From 1300 to 1500, visibility was 15 miles and the ceiling went from broken to a few clouds at 1200 feet agl. The wind was 120° from the southeast at 10 knots.

In the area of the accident, only Quaqtaq Airport had issued a terminal aerodrome forecast (TAF) [10]. The TAF issued at 0900 indicated that the ceiling was 2500 feet agl and visibility was over 6 sm; temporarily from 1300 to 1700, visibility was 5 sm in drizzle and mist with ceiling broken at 900 feet agl. The wind was forecast from the north at 10° and 10 knots.

The GFAs issued at 0141, 0741, and 1341 (see 0741 GFA at Appendix A) indicate a few clouds based at 3000 asl with tops at 6000 feet asl [11] with visibility over 6 sm. [12] The forecast for the incident area called for a fog bank [13] reducing visibility to between ¼ and 2 sm in mist and fog with ceiling of 100 to 400 feet agl. [14]

There were no AIRMETs [15] or SIGMETs [16] issued for the area at the time of the accident.

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9 Quaqtaq Airport is 40 nm northeast of the direct route from Kangirsuk to Kangiqsujuaq and 45 nm east of the accident site.

10 A terminal aerodrome forecast (TAF) describes the most probable weather conditions forecast at an aerodrome and the most probable time they will exist within a radius of 5 nm.

11 Shown as "FEW 30/60" on the GFA.

12 Shown as "P6SM" on the GFA.

13 Shown as a dotted orange line on the GFA.

14 Shown as "WTN DASHED LN, XTNSV 1/4-2SM FG/BR, CIGS 1-4 agl" on the GFA.

15 Weather advisory for aircraft.

16 Significant meteorological information.

Operating in Reduced Visibility

The flight was operating in uncontrolled airspace, that is to say, airspace without air traffic control (ATC) services. For a helicopter flying VFR in uncontrolled airspace, the *Canadian Aviation Regulations* (CARs) [17] require that flight visibility be at least 1 sm when flying under 1000 feet agl and that the helicopter be operated with visual reference to the ground.

In October 2000, in accordance with CAR 703.28(2)(a), Transport Canada issued an operations specification to CHL authorizing day VFR flights in uncontrolled airspace when flight visibility is under 1 sm. This operations specification is valid if the air operator has trained the pilot in accordance with section 723.28 of the Commercial Air Service Standards (CASS).

The company's operating limits, requirements, procedures, and training standards for flying in reduced visibility are set out in its operations manual. The pilot had taken training required by the operations specification for reduced visibility operations and was authorised to fly when visibility was ½ sm or more. The training he was given by CHL included decision making and flying in reduced visibility conditions.
The theory portion of the pilot's training included a review of:

- applicable regulations;
- requirements and procedures set out in the company operations manual;
- weather conditions conducive to precipitation and reduced visibility;
- options available and practices for avoiding areas of low visibility;
- detailed analysis of the route to identify obstructions;
- adverse consequences of flying at low altitude; and
- low-speed flight.

Because the pilot had a valid instrument rating, he was not required to do any training flights for reduced visibility operations.

Operations Control and Monitoring System

CHL is the largest helicopter operator in Canada. It operates about 130 aircraft from bases in the Atlantic provinces, Quebec, and Western Canada. Company pilots may be tasked to fly anywhere in the country.

CHL uses a pilot self-dispatch system. The pilots are fully responsible for preparing, planning, and conducting their flights. They are also required to ensure that their flights are conducted in accordance with existing regulations and company procedures as published in the company operations manual. Pilots must determine whether or not a flight is feasible and prepare a navigation plan. This requires that they plot the route based on aircraft performance, terrain, obstructions, and the weather. Through good planning and preparation, pilots can avoid hazardous situations and make sound decisions on the ground and in the air.

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17 *Canadian Aviation Regulations,* section 602.115.

The pilots are responsible for flight watch using the NAV CANADA flight plan/flight notification system. In Goose Bay a dedicated employee monitors the company flights with the SkyTrac system, supplies weather information and files the flight plans at the pilot's request.

CHL aircraft are equipped with the SkyTrac satellite-based telecommunications system. The system allows flights to be tracked in real time. It is programmed to transmit the position of each aircraft every 15 minutes. SkyTrac also records the times of engine start-up, take-off, landing, and engine shutdown. The SkyTrac system also includes a satellite telephone providing two-way communication between the crew and the air operator. SkyTrac triggers an alarm if a position report is not received. The search was initiated as soon as the aircraft was missing.

Before taking off from Kuujjuaq, the pilot called Goose Bay base three times on the helicopter's satellite phone to request weather information. He was read the METARs, TAF, and GFA and given a verbal account of the region's actual weather. The pilot was informed of the reduced visibility and low ceilings on the route. When the pilot considered that the weather was improving, he advised Goose Bay base that he intended to make the flight.

Use of Global Positioning System

The global positioning system (GPS) allows a pilot to navigate more accurately or to divert effectively. The aircraft had two GPS devices. A Garmin GPSMap 296 was on the instrument panel and a Garmin portable personal model GPSMap 76Cx was also on board. The GPSs recorded flight data from Kuujjuaq to the accident site. The data were downloaded by the TSB Laboratory. The data were consistent, and the minimal differences in position and altitude between the two devices are due to inherent errors in the GPS and to the time the data were recorded.

The Transport Canada *Aeronautical Information Manual* (AIM) describes how to use a GPS [18] properly. In VFR flight, a GPS can be used as a complement to VFR charts, but it must not be used as a substitute for up-to-date charts. The AIM also cautions GPS users to conduct the flight within limit conditions. In this regard, the AIM states that "The risk of becoming lost is small when using GNSS, [19] but the risk of controlled flight into terrain or obstacles increases in low visibility". The term "controlled flight into terrain" (CFIT) used in this case concerns collisions with the ground in which the pilot maintained control of the aircraft but did not see and was not aware of terrain obstructions.

Navigation procedures and the use of navigation aids are reviewed in the initial ground training. CHL does not provide training, nor is it required to provide such training, on the use of GPS in reduced visibility and the specific problems related to the use of GPS, such as entering incorrect waypoints, over-reliance, losing track of time, or losing awareness of terrain.

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[18] AIM, COM 3.16.16, Proper use of GNSS.

[19] Global navigation satellite system; the United States GPS is one of two constellations of navigation satellites in orbit.

Aircraft Information

The Bell 206L was maintained by the CHL approved maintenance organization (AMO) in accordance with the existing regulations and maintenance and inspection program. It had a total of 22 009.7 airframe hours. A 200-hour inspection was completed on 03 July 2009. The aircraft was equipped with an artificial horizon and directional gyro required for flight in zero visibility. It was not certified for instrument flight.

The model 250-C20B engine, built by Rolls Royce (formerly Allison), was examined at the TSB Laboratory. Teardown of the engine and ancillaries revealed no pre-impact deficiencies that would have prevented the engine from operating normally.

The instruments found at the accident site were sent to the TSB Laboratory. The airspeed indicator provided no indications. The directional gyro was functioning at the time of impact. The combined fuel level/fuel pressure indicator showed marks at a fuel level between 20% and 40% and pressure from 20 to 25 pounds per square inch (psi). The engine speed needle of the dual tachometer left imprints between 98% and 99% and at 40%.

Emergency Locator Transmitter

A Kannad emergency locator transmitter (ELT) emitting on frequencies 406 MHz and 121.5 MHz was installed in the tail boom of the aircraft. The antenna on the aft fairing was ripped out of the ELT when the tail boom separated from the fuselage on impact. The case was not damaged in the accident but was coated with soot. The switch was in the ARM position, and was selected OFF by Canada Search and Rescue.

Examination of the ELT established that its operation was not affected by heat. The battery was discharged, which confirms that the ELT activated on impact. No signals were received by satellites or by aircraft flying over the crash site, most likely because the antenna was broken on impact.

The aircraft was located six days after the accident by an Inuit Canadian Ranger team.

The search was complicated by the following factors:

- No ELT signals were received.
- The aircraft was broken into several pieces.
- The aircraft debris blended into the landscape.
- The accident site was 4 nm from the intended route of the aircraft.

Analysis

Examination of the wreckage and components revealed no evidence of airframe failure, control malfunction or loss of power in the helicopter that would have caused the accident. The helicopter struck a rock wall in controlled flight in adverse weather conditions. The analysis will therefore focus on pilot training, decision making, and preparation for the flight.

The pilot had never flown in Northern Quebec. It was also likely his first experience flying in an area under the influence of an Arctic maritime climate. His practical experience did not enable him to fully appreciate the difficulties to be encountered in flight. The pilot had received no specific training on the particular characteristics of this region, [20] while his understanding of the region was limited to discussions with his co-workers and the regional Director of Operations while he was in Goose Bay. Consequently, the pilot was unfamiliar with the coastal topography and its associated weather systems.

First, knowledge of the topography of the Northern Quebec coastline would lead to the conclusion that the multitude of steep-sided arms of the sea makes VFR flight hazardous in reduced visibility. Second, understanding the meteorological characteristics of the region would lead to the realization that the fog in this region is advection fog formed over the ocean that affects the coastal regions. Considering these two elements, a westward diversion should be made to move away from the coast to bypass the areas of reduced visibility.

Before taking off from Kuujjuaq, the pilot obtained weather information to plan the flight. He reviewed the weather information available at the Kuujjuaq FSS and got a verbal description of the weather along the planned flight route from the CHL Goose Bay base. Based on this information, he delayed the flight about two hours.

The pilot appears to have based his decision to take off from Kuujjuaq essentially on the reported visibility at Kangirsuk and Kangiqsujuaq. The hourly observations at 0800, 0900, and 1000 at Kangirsuk and Kangiqsujuaq reported visibility exceeding the minimum visibility required by the CARs to make the flight. In addition, the trend suggested by these observations gave reason to believe that the weather was gradually improving. Visibility at Kangirsuk had indeed improved from ½ sm to 1½ sm, and at Kangiqsujuaq from 5 to 12 sm. Moreover, the weather at Kuujjuaq was good. [21] Also, the drizzle, fog and low cloud reported at Quaqtaq would not delay the flight to Coral Harbour.

For an undetermined reason, the pilot did not call the FIC at Québec to request a printout of the GFA. Because the pilot could have obtained weather information from the Internet, it cannot be stated without a doubt that he did not check the GFA before going to the airport. However, if he had done so, especially being an airline pilot, he would have easily seen that the GFA for the region called for visibilities of ¼ sm to 2 sm in mist/fog and ceilings of 100 to 200 feet between Kangirsuk and Kangiqsujuaq in the coastal area and over the Hudson Strait. Also, by analyzing the GFA he would have seen that the mist was clearing over the land to the west of the shoreline. Given his qualifications, the route he elected to fly and the diversion route he chose, it is unlikely that the pilot checked the GFA on the Internet. Furthermore, it appears that the weather information obtained from the CHL Goose Bay base did not enable the pilot to conceptualize the information provided in the GFA for the region.

En route to Kangirsuk, the aircraft landed 26 sm before destination and stayed on the ground for seven minutes. Because he did not report the interruption of the flight when he called CHL at Kangirsuk, the hypothesis that the stop was due to a malfunction can be ruled out. Adverse weather is one possible reason, among others, for the unscheduled landing.

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20 This training is not a requirement.

21 Visibility was 15 sm and the ceiling 3400 feet agl at Kuujjuaq at the time of take-off.

According to the information relayed to the pilot, visibility at Kangirsuk had increased from ½ sm to 15 sm and the ceiling from 200 feet agl to a few clouds at 600 feet agl in the previous three hours. Further, the information he received from the CHL Goose Bay base before taking off from Kangirsuk indicated VFR conditions at all the airports where the aircraft was to stop. Consequently, the pilot's decision to continue the flight was reasonable and consistent with his knowledge of the situation.

The GPS data indicate that the flight to Kangiqsujuaq was normal until 44 nm from destination. Because the aircraft was flying at low altitude and high speed, [22] there is reason to believe that the ceiling was low but that visibility was not a hindrance to pilot navigation. However, at that point the helicopter diverted from the direct route and proceeded north towards the coast. By all indications, the pilot diverted due to reduced visibility.

The pilot had three options when he diverted. First, he could land and wait for conditions to improve. Once on the ground, he could call the CHL Goose Bay base to request a weather update and select a better diversion route. Because the weather was not as the pilot had anticipated, and with the benefit of hindsight, that would have been the most reasonable decision. Given the pilot's experience in flying with little or no visibility, it is possible that GPS gave him greater confidence when he encountered poor weather conditions.

Second, the pilot could have diverted west and proceeded farther inland. There is reason to believe that if the pilot had checked the GFA before taking off from Kuujjuaq, he would have chosen that option (see Appendix A). The rolling terrain was suitable for low-level flight, and the area of mist/fog was clearing to the west. A thorough analysis of the full weather picture and the planned route would have enabled the pilot to choose that option.

The third option—diverting towards the coast—was the least likely to succeed due to the precipitous coastal terrain and the misty conditions moving inland from Hudson Strait. Because of this, the helicopter headed towards an area where the mist/fog was thickening over terrain that was not suitable for low-level flight. Evidence of this can be seen in the decrease in groundspeed and height of the aircraft above the terrain.

The accident occurred just under 1 nm from the coast while the aircraft was traversing a valley. The GPS data indicate an increase in speed and a loss of altitude after the northbound aircraft flew over the summit of the south wall of the valley. It is possible that the pilot was not aware of his geographical position. If that was the case, he did not know he was about to traverse a valley. The need to maintain visual references therefore led the pilot to follow the downward slope in conditions of reduced visibility. Taking into account his speed, the pilot was unable to avoid the north wall of the valley.

The following TSB Laboratory reports were completed:

LP 104/2009 – Engine Examination

LP 106/2009 – GPS Analysis

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[22] The helicopter was travelling at approximately 100 mph; the maximum allowable speed with floats is 120 mph.

LP 116/2009 – Impact Measurements

These reports are available from the Transportation Safety Board of Canada upon request.

Findings as to Causes and Contributing Factors

1. The pilot continued the flight in adverse weather in an area where he was unfamiliar with the topography and the associated local weather systems.

2. In reduced visibility, the pilot diverted towards the shore of the Hudson Strait—a location where the weather was deteriorating and where the precipitous terrain was unsuitable for low-altitude flight. Consequently, the helicopter struck a rock wall in controlled flight in adverse weather.

3. Although not a requirement, specific training on the particular characteristics of this region would have enabled the pilot to fully appreciate the difficulties to be encountered in flight.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 09 November 2010.

Appendix A – Graphic Area Forecast (GFA)

This is the GFA available prior to take-off from Kuujjuaq, Quebec: