Aviation Investigation Final Report

Location:	Iliamna, Alaska	**Accident Number:**	ANC12FA006
Date & Time:	October 29, 2011, 20:09 Local	**Registration:**	N165EH
Aircraft:	Eurocopter AS 350 B2	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The helicopter pilot was under contract to support an aerial seismic survey project in a remote part of western Alaska. The survey crew had completed their survey, and the pilot, who was the only occupant, was relocating the helicopter to the operator's base in south central Alaska; however, poor weather conditions delayed his departure until mid-afternoon on the fourth day. The pilot made two fuel stops while en route, and both fuel vendors noted that the pilot seemed rushed and that he mentioned that he was trying to get to his destination before dark. The operator reported the helicopter overdue when the helicopter failed to arrive and they were unable to make contact with the pilot. Searchers discovered the fragmented wreckage about 7 miles southwest of the destination airport, in an area of marshy, tundra-covered terrain.

Dark night visual meteorological conditions prevailed at the destination airport before the accident, and transient snow showers and reduced visibility were reported in the area just after the accident. Examination of the helicopter and engine revealed no preaccident mechanical anomalies that would have precluded normal operation. The debris path and extensive fuselage fragmentation were consistent with the helicopter impacting terrain at high speed.
The pilot's autopsy revealed several heart abnormalities, including an enlarged heart, a 90-percent occlusion of the left anterior descending coronary artery, a 99-percent occlusion of the right coronary artery, and an aortic valve that was severely calcified and stenotic. Such findings would have put the pilot at high risk of a sudden cardiac event, including acute myocardial infarction, syncope, or arrhythmia, any of which would have impaired or incapacitated him. Further, the weather and the pilot's rush to reach his destination by nightfall after a 4-day delay may have contributed to the pilot's stress level, increasing the risk that his severe but undiagnosed heart disease would cause an acute medical event during the flight.

Given the lack of mechanical deficiencies that would have precluded normal operation of the helicopter,

and the pilot's severe coronary artery disease and aortic stenosis, it is likely that the pilot's medical conditions caused sudden impairment or incapacitation, which resulted in the loss of control of the helicopter. Although it is possible that the pilot did not recognize that he was flying the helicopter in a shallow descent into terrain, the overwhelming evidence of heart disease compounded by stress makes it more likely that the pilot was impaired or incapacitated.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's loss of control due to sudden medical impairment or incapacitation.

Findings

Personnel issues	Cardiovascular - Pilot
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Enroute-cruise	Loss of control in flight (Defining event)
Enroute-cruise	Collision with terr/obj (non-CFIT)

On October 29, 2011, about 2009 Alaska daylight time (ADT), a Eurocopter AS350-B2 helicopter, N165EH, was destroyed during a collision with tundra-covered terrain about 7 miles southwest of Iliamna, Alaska. The pilot, the only occupant, died at the scene. The helicopter was operated by ERA Helicopters LLC, Anchorage, Alaska, as a 14 CFR Part 135 visual flight rules (VFR) on-demand charter flight when the accident occurred. Dark night, visual meteorological conditions (VMC) prevailed at the Iliamna Airport. The flight originated in Nome, Alaska about 1343, with fuel stops in Unalakleet and Bethel, Alaska before continuing to Iliamna, the flight's destination for the day. VFR company flight following procedures were in effect.

During an interview with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), on October 30, the operator's general manager reported that the accident helicopter was under contract to Fugro Airborne Surveys to support an aerial seismic survey project near Nome. He said that the survey crew had completed their survey, and the two survey crew members returned to Anchorage on October 25. The pilot planned to rendezvous with the crew in Anchorage, so that the specialized survey equipment which was still installed in the helicopter could be removed. However, continuous poor weather conditions delayed the pilot's departure from Nome until the afternoon of October 29.

The accident helicopter was equipped with a Sky Connect onboard satellite tracking system, which provides flight dispatchers with real-time position reports about every minute, as well as providing satellite phone communication with the pilot. The operator provided the NTSB with archived Sky Connect flight track data, which shows that after refueling in Bethel, the helicopter departed about 1755 en route to Iliamna. As the flight progressed along an easterly heading toward Iliamna, and eventually along the northern shore of Iliamna Lake, the Sky Connect system signal was lost at 2008, about 8 miles southwest of Iliamna, and subsequent attempts to contact the helicopter were unsuccessful.

The Federal Aviation Administration (FAA) issued an alert notice (ALNOT) on October 30, at 0615 Alaska daylight time.

The following morning, the crew of a company owned and operated Bell 212 helicopter discovered the fragmented wreckage about 7 miles southwest of Iliamna, in an area of marshy, tundra-covered terrain.

During telephone conversations with an NTSB investigator on October 31, the fuel vendors in Unalakleet and Bethel consistently noted that the pilot seemed rushed, and both reported him mentioning that he was trying to get to Iliamna before dark.

Sunset on the day of the accident was 1833; the end of civil twilight was 1917.

Pilot Information

Certificate:	Commercial	**Age:**	66
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	February 10, 2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 5, 2011
Flight Time:	11091 hours (Total, all aircraft), 5097 hours (Total, this make and model), 11076 hours (Pilot In Command, all aircraft), 105 hours (Last 90 days, all aircraft), 45 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

The pilot, age 66, held a commercial helicopter pilot certificate, and a helicopter instrument rating. In addition, he held a commercial airplane pilot certificate with airplane single-engine land, multiengine land, and an instrument airplane rating. The most recent second-class medical certificate was issued to the pilot on February 10, 2011, which contained the limitation that he wears corrective lenses.

In the Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1) submitted by ERA Helicopters, the pilot's total aeronautical experience was listed as 11,091 flight hours, with 5,097 hours in the accident helicopter make and model. The report noted that in the preceding 90 and 30 days prior to the accident, the pilot flew a total of 105 hours and 45 hours.

The pilot's normally scheduled duty day was from 0700 to 2100. In the three days prior to the accident, the pilot was on duty, but he did not fly due to continuous poor weather condition in Nome. On the day of the accident, his duty day started at 0700. After departing from Nome about 1343, the helicopter flew about 5.0 hours before the accident.

Aircraft and Owner/Operator Information

Aircraft Make:	Eurocopter	**Registration:**	N165EH
Model/Series:	AS 350 B2	**Aircraft Category:**	Helicopter
Year of Manufacture:	1989	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2185
Landing Gear Type:	High skid; Skid	**Seats:**	6
Date/Type of Last Inspection:	October 26, 2011 AAIP	**Certified Max Gross Wt.:**	4961 lbs
Time Since Last Inspection:	35 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	9124 Hrs at time of accident	**Engine Manufacturer:**	TURBOMECA
ELT:	C126 installed, not activated	**Engine Model/Series:**	ARRIEL 1SER
Registered Owner:	ERA HELICOPTERS LLC	**Rated Power:**	681 Horsepower
Operator:	ERA HELICOPTERS LLC	**Operating Certificate(s) Held:**	On-demand air taxi (135)

The helicopter was a Eurocopter AS350-B2, equipped with a Turbomeca Arriel 1D1 turboshaft engine, and it was maintained under the operator's Approved Aircraft Inspection Program (AAIP), which requires inspections to be performed approximately every 100 flight hours.

The helicopter had 9,124.6 flight hours in service at the time of departure from Nome, and about 35 flight hours had elapsed since the most recent phase inspection. The operator estimated that the pilot flew about 5 flight hours on the day of the accident.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	PAIL,192 ft msl	**Distance from Accident Site:**	60 Nautical Miles
Observation Time:	20:20 Local	**Direction from Accident Site:**	6°
Lowest Cloud Condition:	Unknown	**Visibility**	2 miles
Lowest Ceiling:	Broken / 2000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	300°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.3 inches Hg	**Temperature/Dew Point:**	1°C / -3°C
Precipitation and Obscuration:	Light - None -		
Departure Point:	Bethel, AK (PABE)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Iliamna, AK (ILI)	**Type of Clearance:**	None
Departure Time:	17:55 Local	**Type of Airspace:**	Class G

The closest weather reporting facility was the Iliamna Airport, 7 miles northeast of the accident site.

About 11 minutes before the accident, at 1953, an Aviation Routine Weather Report (METAR) was reporting, in part: Wind, 280 degrees (true) at 6 knots; visibility, 5 statute miles with light snow; clouds and sky condition, 3,100 feet overcast; temperature, 36 degrees F; dew point, 27 degrees F; altimeter, 29.28 inches Hg.

At 2020, about 11 minutes after the accident, a special weather observation at the Iliamna Airport was reporting, in part: Wind, 300 degrees at 9 knots, visibility, 1.5 statute miles with light snow; clouds and sky condition, 2000 feet broken, 3,100 feet overcast; temperature, 34 degrees F; dew point, 27 degrees F; altimeter, 29.31 inHg.

A complete Federal Aviation Administration (FAA) weather package is included in the public docket for this accident.

Airport Information

Airport:	ILIAMNA ILI	**Runway Surface Type:**	
Airport Elevation:	192 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	59.676944,-155.103332(est)

The NTSB IIC, along with representatives from ERA Helicopters, Eurocopter USA, Turbomeca USA, and a representative from the FAA Anchorage Flight Standards District Office (FSDO), attempted to reach the accident site by helicopter, but continuous poor weather conditions prevented the team from reaching the site until November 1.

Between the time of the accident, and before the investigative team arrived on scene, the area received about 6 inches of snow, which blanketed the helicopter wreckage.

The main wreckage debris path was oriented on a 040 degree heading, and was about 195 feet long. (All headings/bearings noted in this report are magnetic).

About 180 feet southwest from the main wreckage site was a crater measuring about 4 feet in diameter, and 3 feet deep. This crater is believed to be the point of original impact. The pilot's chin bubble-

mounted cargo minor and the toe of the helicopter's right skid were found within the crater.

The debris path between the crater and the main wreckage site displayed signs of extensive fuselage fragmentation. Debris consisting of small pieces of plexiglas, aluminum, a door frame assembly, and various portions fragmented main rotor blade material, were found within the debris path.

All of the helicopter's major components were located at the main wreckage site. Due to the extensive fuselage fragmentation flight control system continuity could not be established.

The entire tail boom was separated from the fuselage at the forward fuselage to tail boom attach point.

No preaccident mechanical anomalies were noted with the helicopter that would have precluded normal operation.

Examination of the emergency locator transmitter (ELT) revealed that during the impact sequence, the transmitter housing remained attached to the fuselage mounting bracket, but the mounting bracket separated from the fuselage. The separated transmitter and mounting bracket was discovered within the main fuselage. The ELT housing sustained considerable fire damage.

Medical and Pathological Information

A postmortem examination was conducted under the authority of the Alaska State Medical Examiner, Anchorage, Alaska, on October 31, 2011. The cause of death for the pilot was attributed to blunt force, traumatic injuries.

The FAA's Civil Aeromedical Institute performed toxicological examinations for the pilot on January 26, 2012, which was negative for alcohol. The toxicological examination revealed elevated levels of carboxyhemoglobin (carbon monoxide), cyanide, nicotine, and cotinine in the pilot's blood, likely represent of the pilot's heavy cigarette smoking habit.

The NTSB's chief medical officer reviewed the pilot's autopsy, toxicology report, personal medical records, the FAA blue ribbon medical file, and the NTSB IIC's reports.

According to the NTSB medical officer's factual report, the pilot's autopsy identified several heart abnormalities, including an enlarged heart, which weighed 470 grams. The report also noted, in part: "…there was severe calcifying atherosclerosis of all three coronary arteries, with greater than 90 percent occlusion of the left anterior descending coronary artery, and 99 percent occlusion (pinpoint lumen) of the right coronary artery." In addition, the aortic valve was severely calcified and stenotic.

During the medical officer's review of the pilot's medical records on file with the FAA's airman branch, it was revealed that the pilot, in 1995, reported that he had suffered a transient loss of vision in his left eye in June 1994. The FAA required further information and the records from the treating ophthalmologist, revealed that the brief visual loss was the result of a cholesterol embolus lodged in a small retinal arteriole. The NTSB medical officer wrote, in part: "A search for the source ensued: an

echocardiogram was negative and carotid Doppler showed a small area of cholesterol plaque. Although his symptoms resolved, at a follow up exam six months later, dilated fundoscopy revealed an additional area of cholesterol plaque; it was unclear to the ophthalmologist whether this developed locally or was also embolic. In 2002, the pilot was diagnosed with glaucoma. He reported this to the FAA and was given a special issuance certificate that required annual ophthalmologic evaluation. The pilot routinely performed the annual evaluation and, at the time of the accident, held a valid second class certificate, limited only by the requirement that the pilot wear corrective lenses."

A copy of the NTSB chief medical officer's factual report is included in the public docket for this accident.

SEARCH & RESCUE

When the helicopter failed to arrive in Iliamna, company personnel initiated a telephone and satellite phone search to see if the helicopter had diverted to another village. Unable to locate the helicopter, company management personnel contacted the Air Force Rescue Coordination Center, Anchorage to report the missing helicopter.

Rescue personnel aboard an Air National Guard C-130 airplane, aided by high intensity luminescent flares, searched the area throughout the night, but were unable to locate the helicopter, and no ELT signal was detected.

The crew of a company owned and operated Bell 212 helicopter discovered the fragmented wreckage the following morning.

Tests and Research

On February 8, 2012, at the direction and under the supervision of the NTSB IIC, the Turbomeca Arriel 1D1 turboshaft engine was disassembled and examined at Turbomeca USA, Grand Prairie, Texas.

The examination revealed that the engine had circumferential scoring marks to the internal rotating components, consistent with an engine that is developing power at the time of impact. Additionally, the engine had deformation to their first stage compressor blades, with contact signatures to their compressor axial stages, compressor impellers, and shrouds.

There was no evidence of any preimpact mechanical anomalies found with the engine.

Administrative Information

Investigator In Charge (IIC):	Johnson, Clinton
Additional Participating Persons:	Kevin P Grenier; Federal Aviation Administration - Airworthiness; Anchorage, AK Paul White; ERA Helicopters LLC; Lake Charles , LA François Hochart (Accredited Rep) ; Bureau d'Enquêtes et d'Analyses (BEA) Bryan Larimore (Advisor) ; Turbomeca USA ; Grand Praire, TX Seth Buttner (Advisor) ; American Eurocopter; Grand Prairie, TX Jonathan Conrad; ERA Helicopters LLC; Lake Charles, LA
Original Publish Date:	February 13, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=82198