



National Transportation Safety Board Aviation Accident Final Report

Location:	ELFIN COVE, AK	Accident Number:	ANC96FA101
Date & Time:	07/19/1996, 1530 AKD	Registration:	N54LA
Aircraft:	de Havilland DHC-2	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	1 Fatal
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

The pilot of the air taxi cargo flight departed his base of operations in Juneau, Alaska for a series of flights in southeast Alaska that would ultimately return him to Juneau. On the accident leg of the intended round robin, the pilot was en route from Hoonah to Elfin Cove. The flight would originate and end at sea level, and traverse a mountain pass, with minimum obstruction clearance in the pass estimated at 500 feet msl. The airplane collided with steeply rising terrain at the 1,250-foot level about one mile south of the proposed flight path. The airplane was partially consumed by a postimpact fire. The operator initiated a helicopter search within two hours of the time of the accident. The helicopter pilot and his passenger both reported that the area where the accident airplane was eventually located was obscured in low clouds, and that many of the other valleys and mountainsides were covered in clouds. Low clouds persisted in the area of the crash site for the following two days.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's decision to continue VFR flight into instrument meteorological conditions, and his failure to maintain adequate clearance from rising terrain. Factors associated with the accident were the rising terrain and clouds.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: CRUISE

Findings

1. (F) TERRAIN CONDITION - MOUNTAINOUS/HILLY
2. (F) TERRAIN CONDITION - RISING
3. (F) WEATHER CONDITION - OBSCURATION
4. (F) WEATHER CONDITION - CLOUDS
5. (C) VFR FLIGHT INTO IMC - CONTINUED - PILOT IN COMMAND
6. (C) CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On July 19, 1996, about 1530 Alaska daylight time, a float equipped deHavilland DHC-2 airplane, N54LA, operated by Lynden Air Cargo, doing business as Loken Aviation, was destroyed by impact and postcrash fire when it collided with steep terrain near Elfin Cove, Alaska. Variable weather conditions, from visual meteorological to instrument meteorological, were reported in the general vicinity of the accident site. The solo airline transport certificated pilot sustained fatal injuries. The 14 CFR Part 135 on-demand air taxi cargo flight last departed Hoonah, Alaska, approximately 15 minutes prior to the accident, en route to Elfin Cove.

The proposed route of flight was from Juneau, to Hoonah, to Elfin Cove, to Pelican, and return to Juneau. All of the preceding locations are in southeast Alaska.

The flight departed Juneau at 1436, arrived Hoonah at 1455, off loaded and loaded additional cargo for the flights to Elfin Cove and Pelican, and departed Hoonah about 1515.

Company officials expected that the pilot would fly to Elfin Cove via the Tenakee Inlet and Trail River drainage. This route of flight would begin and end at sea level, proceed principally in a northwest direction, and require a minimum obstruction clearance altitude of approximately 500 feet msl. The flight path is generally surrounded by heavily forested, steeply rising terrain (see attached charts).

The wreckage was located by the U.S. Coast Guard on a mountainside at the 1,250 level on July 21 about 1040, after a search by Civil Air Patrol and U.S. Coast Guard aircraft. The accident site was located at geographic coordinates, N58.01.28, W136.06.20, about 15 statute miles from Elfin Cove, on a magnetic bearing of 113 degrees. The accident site was near Pyramid Peak, approximately one mile southwest of the Trail River drainage area.

PERSONNEL INFORMATION

The pilot of the accident airplane was employed as a part-time pilot for the operator, Lynden Air Cargo, and was occasionally employed by another operator, Executive Flight, Inc., as First Officer on a Cessna CE-500 business jet. The pilot's last Federal Aviation Administration (FAA) 14 CFR Part 135 flight proficiency check ride was conducted on January 31, 1996, in a deHavilland DHC-2 airplane.

According to company records and interviews, the pilot was off duty for the three days preceding the accident flight. He had flown earlier the day of the accident, in the accident airplane, accruing 2.6 hours.

AIRCRAFT INFORMATION

The airplane's last inspection was a 100-hour inspection performed on July 9, 1996. At the time of the accident, the airplane had operated about 34 hours since the 100-hour inspection. A review of the airplane's maintenance records did not disclose any unresolved maintenance or mechanical discrepancies with the airplane prior to its departure from Hoonah.

METEOROLOGICAL INFORMATION

The nearest reporting stations to the crash site are Elfin Cove and Gustavus. At 1455, Elfin Cove was reporting: calm winds, a few clouds at 1,900 feet, 3,000 feet overcast, temperature 55 F., dewpoint 50 F., visibility 25 miles. Elfin Cove is approximately 15 miles northwest of the

accident site.

The 1454 weather report from Gustavus reported: 5 knot winds from 200 degrees true, broken clouds at 3,200 feet, overcast 3,800 feet, temperature 58 F., dewpoint 55 F., visibility 10 miles. Gustavus is about 30 miles north-northeast of the accident site.

An interview with the pilot of the helicopter who flew another employee of Lynden Air Cargo in search of the accident airplane, reported that he was unable to initially search the mountains or drainage where the airplane was eventually located due to low clouds. He said that many of the mountains and passes in the immediate vicinity of the accident site, and to the south of Trail River, were similarly occluded. He said the weather was up and down in the drainages, with lots of lower "scud" and obscured mountain sides. The passenger that accompanied the helicopter pilot related essentially the same weather information. The helicopter pilot and his passenger were in the vicinity of the accident site about two hours after the presumed time of the accident.

WRECKAGE AND IMPACT INFORMATION

The on site investigation was conducted by Mr. Matthew Thomas, a Principal Air Safety Inspector for the FAA's Juneau Flight Standards District Office, on July 23.

The wreckage was on the northeast face of a 32 degree sloping ridge. The direction of flight at impact was generally towards Hoonah, the last departure point, and in the opposite direction from Elfin Cove.

The airplane came to rest on a heading of 115 degrees magnetic. Strike marks in the trees from the first observed impact point to point of final rest were also 115 degrees. The first observed impact mark was a broken tree top about 130 feet horizontally from the final resting place.

Both left and right wings were found at the base of trees aligned with the wreckage path. Both wings exhibited impact marks. The wing attach fittings were distorted rearward. Both wing leading edges had circular holes with crushing in the leading edges.

The flaps and ailerons remained attached to the wings, and control cables in both wings were intact and operational from the ailerons to the bellcrank at the wing roots. The right wing's lift strut was located with the wing. The left lift strut was located with the main wreckage.

The remainder of the wreckage was located approximately 100 feet from the initial observed impact mark. There was one fuselage-sized ground scar located 28 feet directly uphill from the resting site of the fuselage.

The overall length of the airframe from propeller hub to tail cone was approximately 30 feet. There was upward crushing on the lower fuselage belly surface. Both floats exhibited rearward crushing from the tips to 10 feet aft.

The fuselage forward of the aft cargo bulkhead was consumed by fire. All soot and burn patterns were vertical. All molten aluminum was pooled, and had dripped vertically downward.

All three steel engine control cables were intact, but all ends were free and disconnected from the engine. The steel flight control cables, and trim cables were intact from the pilot controls to the flight control surfaces. The aileron cables were intact and free from the yoke to the bell cranks at the wing roots.

All engine controls, fuel system components, and the magnesium aft accessory case consumed by fire. No damage was apparent to the accessory gears, crankshaft, connecting rods, or cylinders. All fuel, oil, and ignition leads to the cylinders appeared intact, except for melted non-metallic hoses. All components were discolored. All valves and guides appeared undamaged.

Hartzell Propeller Blades, serial numbers H77450, H77453, and H77454, all exhibited aft bending of the outer 1/3 span, span-wise twisting of the leading edges, leading edge gouging, and chord-wise scratching.

Propeller blade H77454 separated from the propeller hub and was found 20 feet uphill from the main wreckage. The fracture occurred at the hub/clamp attachment. The outer 4 inches of the blade separated and was not found. A single, 25 foot long ground scar slash the width of the propeller blade existed along the flight path and terminated at the location of the separated blade.

The hydraulic flap actuator was attached to the torque tube, the attaching clevis was undamaged, and the attaching bolt was free to rotate in the clevis hole. The actuator housing was partially consumed by fire. The actuator piston was intact and fused to the remaining housing at the aft end fluid port. The flap extension piston rod exhibited heat discoloration, but no mechanical deformation. It was mechanically locked in position, extended 4.0 inches from the cylinder face.

All cockpit and control indicators were destroyed by fire.

FIRE

The airplane was partially consumed by fire at the impact site. The three fuel cells, located directly below the forward cabin, were ruptured. No liquid fuel was present at the crash site.

All aluminum material above the level of the cabin deck forward of the aft cargo bulkhead was consumed or melted. The ferrous engine block, cylinders, and crankshaft were intact, and exhibited discoloration.

All soot trails propagated vertically. All molten aluminum was pooled, and coagulated. Dripping was vertically downward. Examination of the unburned empennage, vertical and horizontal stabilizer surfaces, did not reveal any aft trailing soot, nor any spattered aluminum.

The burn pattern on the surrounding terrain radiated approximately 15 to 20 feet from the center of the fuselage in a circular pattern, elongated in an uphill direction. Outside of this radius, no indications of fire damage was found on foliage, nor was any fire damage found on the wreckage path.

MEDICAL AND PATHOLOGICAL INFORMATION

The Chief Medical Examiner for the State of Alaska, Department of Public Health, (5700 Tudor Road, Anchorage, Alaska) conducted the postmortem examination of the pilot. His report says, in part: "...examination demonstrates this subject to have died from impact injuries... . He was deceased prior to the post crash fire... "

SURVIVAL ASPECTS

The fuel cells were ruptured, exposing an estimated 70 gallons of aviation gasoline to ignition sources. The battery was located on the forward side of the engine firewall. A fuel and

magnesium fed fire existed in 100% of the cockpit and cabin.

An ELT was located in the aft fuselage. All electrical leads were intact. The battery pack had melted and was partially consumed by fire. The external antenna was burned and melted from the fuselage.

TESTS AND RESEARCH

Flap actuator extension comparison to that of an installed actuator revealed flap extension of 42 degrees, or halfway between takeoff and landing flap settings. Extension of the flaps in the DHC-2 requires two distinct pilot actions. First, the pilot must place a hydraulic selector valve in either the "extend" or "retract" position. Second, the pilot must operate a hand pump to actually reposition the flaps to the desired setting. Between eight and nine strokes of the hand pump is required to extend the flaps to the setting found at impact.

ADDITIONAL INFORMATION

The NTSB investigator-in-charge traveled to Juneau for interviews with the operator and other company personnel/witnesses on September 18.

The wreckage was released to the operator on July 29, 1996.

Pilot Information

Certificate:	Airline Transport	Age:	50, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	Last FAA Medical Exam:	03/25/1996
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	2999 hours (Total, all aircraft), 616 hours (Total, this make and model), 2921 hours (Pilot In Command, all aircraft), 178 hours (Last 90 days, all aircraft), 62 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	de Havilland	Registration:	N54LA
Model/Series:	DHC-2 DHC-2	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	724
Landing Gear Type:	Float	Seats:	2
Date/Type of Last Inspection:	07/09/1996, 100 Hour	Certified Max Gross Wt.:	5090 lbs
Time Since Last Inspection:	33 Hours	Engines:	1 Reciprocating
Airframe Total Time:	11047 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	R-985
Registered Owner:	INIAN, INC.	Rated Power:	450 hp
Operator:	LYNDEN AIR CARGO	Operating Certificate(s) Held:	On-demand Air Taxi (135)
Operator Does Business As:	LOKEN AVIATION	Operator Designator Code:	LR7A

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Day
Observation Facility, Elevation:	PAE, 0 ft msl	Distance from Accident Site:	13 Nautical Miles
Observation Time:	1455 ADT	Direction from Accident Site:	293°
Lowest Cloud Condition:	Unknown / 0 ft agl	Visibility	0 Miles
Lowest Ceiling:	Unknown / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	Calm /	Turbulence Type Forecast/Actual:	/
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29 inches Hg	Temperature/Dew Point:	11° C / 9° C
Precipitation and Obscuration:			
Departure Point:	HOONAH, AK (HNNH)	Type of Flight Plan Filed:	Company VFR
Destination:	(ELV)	Type of Clearance:	None
Departure Time:	1515 ADT	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC): JAMES D LABELLE **Report Date:** 04/10/1998

Additional Participating Persons: MATTHEW L THOMAS; JUNEAU, AK

Publish Date:

Investigation Docket: NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at <http://dms.nts.gov/pubdms/>.

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).