



National Transportation Safety Board Aviation Accident Final Report

Location:	NIKABUNA LAKE, AK	Accident Number:	ANC93FA152
Date & Time:	08/19/1993, 1522 AKD	Registration:	N321KA
Aircraft:	DE HAVILLAND DHC-3	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	3 Minor, 3 None
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

THE ON-DEMAND FISHING/HUNTING CHARTER AIR CARRIER PILOT EXPERIENCED A TOTAL LOSS OF POWER AND LANDED IN A SMALL LAKE. DURING THE GROUND RUN FOLLOWING THE EMERGENCY LANDING A OIL-FED FIRE DESTROYED THE ACFT. INVESTIGATORS FOUND INADEQUATE FLIGHT FOLLOWING DOCUMENTATION, AND FUEL RECORDS OR MAINTENANCE RECORDS FOR ACCIDENT ACFT OR OPERATION. PASSENGER WITNESSES REPORTED LOW FUEL GAUGES PRIOR TO TAKEOFF. FUEL PUMP EXAMINATION INDICATED FUEL STARVATION.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: FLUID, FUEL STARVATION AS A RESULT OF THE PILOT-IN-COMMAND'S IMPROPER IN-FLIGHT PLANNING/DECISION. A FACTOR IN THE ACCIDENT WAS THE OPERATOR'S INADEQUATE FLIGHT TIME AND FUEL UPLOAD RECORD KEEPING.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL

Phase of Operation: CRUISE

Findings

1. (C) FLUID,FUEL - STARVATION
2. MAINTENANCE,SERVICE OF AIRCRAFT/EQUIPMENT - INFORMATION INSUFFICIENT - COMPANY MAINTENANCE PERSONNEL
3. (F) FACILITY,INADEQUATE COMPLIANCE(DOCUMENTATION) - COMPANY/OPERATOR MANAGEMENT
4. (C) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND

Occurrence #2: FIRE

Phase of Operation: LANDING - ROLL

Factual Information

HISTORY OF FLIGHT

On August 19, 1993, at approximately 1522 Alaska daylight time, a float equipped de Havilland DHC3 Otter, N321KA, operated by Ketchum Air Service of Anchorage, Alaska, experienced a non-mechanical loss of engine power during climb from Nikabuna Lake, near Iliamna, Alaska. The commercial pilot executed a forced landing on a small pond, and the airplane overran the water area into woodland and caught fire. The airplane was destroyed. The pilot and two passengers were uninjured, while three passengers received minor injuries. The flight had originated in Anchorage at approximately 0800 on a company VFR flight plan with multiple stops on a 14 CFR Part 135 on-demand flight to transport passengers and cargo between lakes and to Anchorage. Visual meteorological conditions existed.

The pilot told investigators that he had 100 gallons of fuel on board, 85 gallons in the centre tank and 15 gallons in the forward tank. Recalling that the engine lost power as he leveled into cruise flight below 1000 feet, above ground level (agl), he said that he "switched tanks to the forward tank and hit the boost pump when it quit, but (the engine) didn't start." The pilot then glided the airplane to a small tundra pond and attempted an emergency landing. The available water landing area was approximately 750 feet in length and the airplane overran the water and entered a wooded area, coming to rest approximately 350 feet from the water's edge.

A passenger, a U.S.A.F. mechanic in the right seat of the airplane, provided a statement that said the "fuel gauges read E" at the time of takeoff from Nickabuna Lake, approximately three minutes before power was lost. That passenger confirmed that the pilot attempted to restart the airplane by use of the electrical boost pump and the starter, but stated that he did not observe the pilot switch fuel tanks.

Witnesses told investigators that a "fire with red flames and black smoke, about 10 feet high lasted about a minute and then turned to white smoke and burned the plane. (See photographs taken by witness.)

INJURIES TO PERSONS

Three of the five passengers reported minor injuries sustained in the impact with the terrain following the forced landing on the small lake.

DAMAGE TO AIRCRAFT

The aircraft fuselage was destroyed from the rear of the engine at the accessory section through the cockpit and cabin to the tail cone by being reduced to ashes by fire. While the accessories mounted on the rear of the engine, as well as the rear of the engine case itself, sustained substantial thermal damage, the front of the cylinders and the propeller was unremarkable. The tail cone and wings, while burned off at their respective junctions with the fuselage, were themselves undamaged. There was no evidence of hydrocarbon soot underneath the horizontal tail surfaces or wing surfaces.

Molten metal and thermal damage to aircraft frame structure was centered at the location of the 40 quart oil tank behind the pilot's seat. (Refer to Wreckage and Impact Information for details of damage to the aircraft.)

AIRCRAFT INFORMATION

The operator advised the investigators that the airplane had undergone a 100 hour inspection on August 9, 1993. An investigation of company records failed to locate certain inspection records for the 100 hour inspection, including the oil sample analysis sheet, or the engine cylinder compression sheet.

The company maintenance director told investigators that an oil sample was drawn and sent for analysis and an engine cylinder compression check was completed at that time. Mr. Craig Ketchum, a company owner, told investigators that an oil sample had been sent to Skywatch Oil Analysis Company following the 100 hour inspection of the engine. The president of Skywatch Oil Analysis Company was contacted and he told investigators that his company had not received an oil sample from the Ketchum company on or after August 9, 1993, nor did the Skywatch company have record of any other recent oil sample drawn from the accident airplane.

Investigators, in reviewing maintenance records for the accident airplane, found that six Airworthiness Directives (AD's) had not been completed on the accident airplane. These AD's required that inspections be performed since 1992 on airplane flight controls, propeller blades, engine cylinders and flight surface integrity.

METEOROLOGICAL INFORMATION

Witnesses indicated that visual meteorological conditions prevailed at the time of the accident. Photographs of the accident scene, taken by a pilot from the same operator, showed low stratus clouds of an undetermined height, and visibility of three to six miles.

WRECKAGE AND IMPACT INFORMATION

Investigators measured parallel ground scars from west to east, beginning at the edge of a shallow lake, approximately 400 yards in diameter. The scars ended at the wreckage approximately 170 yards from the lake edge. Sixty feet from the wreckage, a rock outcropping found in the left continuous ground scar, was marked and scarred with paint and particles matching those on the left float.

The engine's carburetor had been exposed to thermal energy and was removed for examination.

The propeller was found without visible indication of rotation at impact. One blade of the three-bladed propeller had been thrust vertically into the tundra and the engine, which had been burned away at the firewall mountings, rested on that propeller blade. There was no evidence that the blade had been rotating when it penetrated the tundra. When that blade was withdrawn from the soil and vegetation, there were no scratches of a rotational origin.

The airplane's wings were intact except for a leading edge strike of approximately 6 inches in diameter, on the left wing near the tip. Both wings were drooped as they were burned off at the roots, however they remained aligned at right angles to the fuselage. Neither wing showed evidence of soot on the underside, nor was any scorching found. No soot was found under the horizontal stabilizers of the burned-off tail cone.

The right float showed no impact damage, however showed thermal damage to the inboard face. The right float showed impact damage to the front, misalignment to the diagonal and nearly total thermal destruction under the fuselage.

WITNESS INTERVIEW INFORMATION

The pilot stated, that prior to takeoff from Nikabuna Lake and total power loss shortly thereafter, he observed approximately 100 gallons of fuel indicated on the aircraft's fuel gauge indicator. He said that it was distributed roughly 85 gallons in the centre tank and 15 gallons in the forward tank.

See statements of witnesses attached.

FIRE

No evidence of fuel or oil residue was found along the ground scar track, before or after the impact mark on the rock outcropping. No fire pattern, burned material or charring was found along the track. No fuel residue was found near or around, in any direction, of the aircraft hull. Scorching of bushes was found adjacent the left fuselage from the firewall location aft to the trailing edge of the left wing, out to approximately two feet.

Scorching of bushes and small trees was similar of the right side of the aircraft to a distance limited by the right float, which sustained thermal damage to its skin on the inboard side. The outboard skin of the right float was unremarkable. No flame pattern or scorching was visible beyond three feet in any direction.

Investigators found the left float diagonally under the fuselage and that float's mounting struts to be impaled into the fuselage underbelly. At the location of that impingement, centered at the location of the center under-belly and lube oil tank, a concentration thermal damage was found to have melted aircraft framework structure.

Investigators found the fuel tank selector switch in the debris of the cockpit. The selector switch was within the arc selected for main fuel tank.

Thermal damage was greatest at the location of the oil tank and continued fore and aft with less thermal damage evident to the remaining cabin structure. The indicator of the degree of thermal damage was the extent to which the fusing and melting of metals had taken place. At the location of the oil tank, thermal twisting and bending of steel cross members, four inches in width had taken place and all aluminum had puddled. At the sides and aft of the cabin, aluminum had been burned but not puddled, and steel parts and cargo was not distorted.

Investigators found that the fire had consumed the aircraft interior and halted at a point before the tail cone, and before burning the wings. The fire had consumed the cockpit instruments and had exposed the rear of the engine to thermal energy sufficient to melt aluminum, where accessory driven units were mounted.

The flora along side the aircraft was a combination of low-bush blue berries and 10 foot to 20 foot black spruce tree. This vegetation showed no thermal damage beyond 24 inches from the burned fuselage. Blueberries at 24 inches from the hull had not been burned.

TESTS AND RESEARCH

The engine driven fuel pump drive shaft was found in the teardown to have sheared. The pump and shaft was sent to the Transportation Safety Board of Canada, for further metallurgical examination and analysis. The findings of that analysis indicate that failure was consistent with failure of the shaft due to seizure from rotation without fuel being present. (See attached report of that examination.)

ADDITIONAL INFORMATION

Investigators found that the operator had no records available to determine when the aircraft departed the remote locations or arrived at the next location. No fueling records were kept at the facility and no records were available to reconstruct the pilot's intended route of flight or names or numbers of passengers on board. No communications were maintained with the pilots operating in the remote areas. Flight following was limited to the arrival or non-arrival of the flight at the end of the day, however, no record of passengers was kept by the operator, except after the fact. Operations records of departures, pilot assignments and passenger names obtained by the investigators were in the form of a spreadsheet filled in by pencil with approximately 30% of the boxes erased or erased and rewritten. The company could not provide a record of the names of the passengers on board the accident airplane until the passengers were returned by Search and Rescue (SAR) aircraft.

The management of the company told investigators while receipts for passenger fares were made out, that the company "threw them away" the same day. Company management could not provide investigators with the fare records or "trip tickets" for the passengers of the accident flight, or any other passengers on the day of the accident, or the following day.

The Pratt & Whitney engine , R-1340-61, SN ZP103122, was examined and torn down at SeaAirmotive, Lake Hood, Anchorage, on August 26, 1993. The procedures and the findings of fact associated with that teardown is attached. (See report attached of FAA Airworthiness Inspector Ernest A. Keener, FSDO-03, party to the NTSB investigation).

All aircraft parts were released to Neil Webster, Professional Adjusters, Anchorage, as agent for the owner/operator.

Pilot Information

Certificate:	Commercial	Age:	34, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	04/01/1993
Occupational Pilot:	Last Flight Review or Equivalent:		
Flight Time:	7500 hours (Total, all aircraft), 350 hours (Total, this make and model), 7500 hours (Pilot In Command, all aircraft), 200 hours (Last 90 days, all aircraft), 80 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	DE HAVILLAND	Registration:	N321KA
Model/Series:	DHC-3 DHC-3	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	415
Landing Gear Type:	Float	Seats:	11
Date/Type of Last Inspection:	08/09/1993, 100 Hour	Certified Max Gross Wt.:	8000 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	7200 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	R-1340-61
Registered Owner:	KETCHUM AIR SERVICE, INC.	Rated Power:	600 hp
Operator:	KETCHUM AIR SERVICE INC.	Operating Certificate(s) Held:	On-demand Air Taxi (135)
Operator Does Business As:		Operator Designator Code:	ELRA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	, 0 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	1500 ADT	Direction from Accident Site:	0°
Lowest Cloud Condition:	Scattered / 0 ft agl	Visibility	5 Miles
Lowest Ceiling:	Overcast / 1500 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	5 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	120°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	10° C
Precipitation and Obscuration:			
Departure Point:		Type of Flight Plan Filed:	Company VFR
Destination:	ANCHORAGE, AK (LHD)	Type of Clearance:	None
Departure Time:	1520 ADT	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Destroyed
Passenger Injuries:	3 Minor, 2 None	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	3 Minor, 3 None	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	DOUGLAS R HERLIHY,	Report Date:	10/20/1994
Additional Participating Persons:	ERNEST A KEENER; ANCHORAGE, AK JAMES DONNELLY; CANADA M3K1Y5, PAUL A KERSTETTER; ANCHORAGE, AK DON ENNS; RICHMOND HILL,		
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 pubinquiry@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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