

Aviation Investigation Final Report

Location:	DUCHESNE, Utah		Accident Number:	SEA94GA203
Date & Time:	July 30, 1994, 18:50 Local		Registration:	N12UT
Aircraft:	HUGHES	OH-6A	Aircraft Damage:	Destroyed
Defining Event:			Injuries:	1 Fatal
Flight Conducted Under:	Public aircraft			

Analysis

WHILE RETURNING TO SALT LAKE CITY FROM THE SOUTHEAST, THE PILOT REPORTED SEEING THUNDERSTORMS IN THE AREA. AT ABOUT 1843 MDT, THE HELICOPTER CHANGED COURSE AND PROCEEDED OVER MOUNTAINOUS TERRAIN WITH A MODE C ALTITUDE READOUT OF 9600 TO 9800 FEET MSL. THE TERRAIN ELEVATION ALONG THE FLIGHT PATH CHANGED FROM 7700 TO ABOUT 10,000 FEET. SHORTLY AFTER PASSING OVER TERRAIN NEAR 10.000 FEET. THE PILOT RADIOED A MAYDAY AND DECLARED THAT THE ENGINE WAS LOSING POWER. THE HELICOPTER BEGAN A DESCENT, ROUGHLY FOLLOWING A CANYON DRAINAGE AREA. SUBSEQUENTLY, IT CRASHED AT AN ELEVATION OF APPROXIMATELY 8850 FEET AFTER IMPACTING TREES. THE LONGITUDINAL WRECKAGE DISTRIBUTION WAS MINIMAL, INDICATING SLOW FORWARD VELOCITY AT TREE IMPACT. AN EXAM OF THE ENGINE REVEALED EVIDENCE OF POWER PRODUCTION DURING IMPACT: NO PREIMPACT PART FAILURE/MALFUNCTION WAS FOUND. THE DENSITY ALTITUDE WAS ESTIMATED TO BE ABOUT 12,000 FEET, AND THE HELICOPTER'S GROSS WEIGHT AT THE TIME OF THE ACCIDENT WAS ESTIMATED TO BE 1977 POUNDS. PERFORMANCE EVALUATION SHOWED THAT WITH THESE CONDITIONS, THE HELICOPTER WOULD HAVE BEEN UNABLE TO MAINTAIN A HOVER OUT OF GROUND EFFECT. THE ROTOR BLADES SHOWED ROTATIONAL ENERGY IMPACT SIGNATURES.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: THE PILOT'S IMPROPER IN-FLIGHT PLANNING/DECISION AND FAILURE TO MAINTAIN SUFFICIENT ALTITUDE/CLEARANCE FROM THE SURROUNDING TERRAIN. FACTORS RELATED TO THE ACCIDENT WERE: THUNDERSTORMS IN THE AREA (REQUIRING THE PILOT TO DEVIATE FROM THE DESIRED COURSE), HIGH MOUNTAINOUS TERRAIN, AND HIGH

Findings

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

Findings

1. (F) WEATHER CONDITION - THUNDERSTORM

2. (F) TERRAIN CONDITION - HIGH TERRAIN

3. (C) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND

4. (F) WEATHER CONDITION - HIGH DENSITY ALTITUDE

5. (F) TERRAIN CONDITION - MOUNTAINOUS/HILLY

6. (C) ALTITUDE/CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND

7. PRECAUTIONARY LANDING - NOT PERFORMED - PILOT IN COMMAND

8. ROTOR RPM - NOT MAINTAINED - PILOT IN COMMAND

9. OBJECT - TREE(S)

Factual Information

HISTORY OF FLIGHT

On July 30, 1994, approximately 1850 hours mountain daylight time (MDT), a Hughes OH-6A helicopter, N12UT, registered to and operated by the Utah Department of Public Safety, and being flown by Doyle R. Thorne, a commercial pilot, was destroyed during a descent into a heavily wooded ridge line, approximately 26 nautical miles west of Duchesne, Utah. The pilot was fatally injured. The precise meteorological conditions in the vicinity of the accident site were unknown, and the helicopter was operating under flight following procedures with the Utah Highway Patrol at the time of the accident. The flight, which was returning from a cancelled search mission, was public use and was to have been operated in accordance with Utah State procedures. The flight originated from the Salt Lake City International Airport approximately 1725 hours.

According to recorded radio communications between N12UT and the Highway Patrol Dispatch facility (call sign "Control"), the search mission which the aircraft had been launched on was cancelled at 1843:10 (dispatch clock time) and the pilot acknowledged the cancellation.

At 1843:18 (dispatch clock time), the pilot was advised by Control of "thunderstorms south of the Salt Lake valley and they are eastbound" and the pilot responded "I'm looking at thunderstorms all around I'll keep up my [unintelligible]." Salt Lake Air Route Traffic Control Center (SLC ARTCC) radar showed the aircraft proceeding generally west-northwest at this time.

Approximately 1843 (SLC ARTCC clock time), the aircraft turned to a westerly heading and proceeded up the Pine Hollow drainage showing a mode C altitude readout of 9,600 to 9,800 feet MSL. The ground elevation along the flight path changed from approximately 7,700 feet MSL, climbing to a height of approximately 10,000 feet MSL (refer to CHART I).

At 1846:18 (SLC ARTCC clock time), the aircraft's radar target showed the aircraft at 40 degrees 02 minutes 38 seconds north and 110 degrees 58 minutes 08 seconds west at an altitude of 9,800 feet MSL. At 1847:29 (SLC ARTCC clock time) the aircraft's radar target showed the aircraft at 40 degrees 03 minutes 38 seconds north and 110 degrees 58 minutes 47 seconds west at an altitude of 9,600 feet MSL. This was the last recorded radar target, with the previous two targets showing the aircraft in a right-hand turn roughly following the drainage running northeast and beginning slightly east of Strawberry Peak (refer to ATTACHMENT RD-1 and CHART I). The average ground speed between these last two targets was calculated as approximately 56 knots whereas the average ground speed between the previous two targets was approximately 137 knots.

At 1850:01 (dispatch clock time), dispatch recorded a transmission from N12UT beginning with a keyed microphone followed at 1850:04 (dispatch clock time) by a call from the pilot "Control, Air twelve; Control, Air twelve." Dispatch responded at 1850:08 (dispatch clock time) and immediately thereafter (at 1850:09 dispatch clock time) the pilot radioed "Mayday, I have a problem...coming into the canyon...below ten thousand feet, I'm losing power...I'm going into the trees." No further transmissions were received from the aircraft.

PERSONNEL INFORMATION

The pilot possessed a commercial pilot's certificate with a reported 425 total flight hours in the OH-6A aircraft, all of which was pilot in command. He was also reported to have a total of 1,731 hours of rotorcraft flight time of which 1,128 hours were pilot in command. The pilot's flight records showed that he had received 5.0 and 6.5 hours of ground and flight time respectively in mountain flight operations on May 19, 1994.

AIRCRAFT INFORMATION

The aircraft's maximum gross takeoff weight was 2,550 pounds. The weight of the aircraft at the time of the accident was estimated to be 1,977 pounds based upon a fuel load of 202 pounds. Performance planning information provided by the manufacturer indicated that at a weight of 1,977 pounds, a temperature of 70 degrees Fahrenheit, and an altitude of 9,590 feet (MSL), the maximum weight of the aircraft to maintain hover out of ground effect (OGE) would be 1,950 pounds (refer to ATTACHMENT W-B). Increasing temperature or altitude (density altitude) would further degrade the aircraft's hovering capability out of ground effect.

METEOROLOGICAL INFORMATION

The 1848 local surface weather observation at Price, Utah, bearing 148 degrees magnetic and 29 nautical miles from the accident site, reported a surface temperature of 87 degrees F., with winds of 10 knots from 240 degrees (true) and a peak wind of 14 knots. The Price observation facility is 5921 feet MSL.

The 1854 local surface weather observation at Provo, Utah, bearing 268 degrees magnetic and 36 nautical miles from the accident site, reported a surface temperature of 71 degrees F., with winds of 17 knots from 130 degrees (true). The Provo observation facility is 4491 feet MSL (refer to CHART II).

The interpolated upper air winds from the Salt Lake City radiosonde for 1800 hours local were as follows:

	ALTITUDE	E: TRUE DIF	R: SPEE	D:	9,000 ft 2	271	12	10,000 ft
267	14	11,000 ft	264	14	12,000 ft	263	14	

Density altitude was estimated on a range of temperatures (from 64 degrees F. through 87 degrees F.) at 10,000 feet MSL. The lowest estimated density altitude (corresponding to 64 degrees) was 12,036 feet whereas the highest estimated density altitude (corresponding to 87 degrees) was 13,382 feet (refer to attached Weather Factual Report).

COMMUNICATIONS

A digital recording of the communications between the Utah Highway Patrol Dispatch facility and N12UT was provided to the Safety Board and translated into audio format (refer to Factual Report of Investigation Seltronics Digital Recording).

WRECKAGE AND IMPACT INFORMATION

The ground impact site was situated within a heavily wooded, moderately sloped mountainside. The latitude and longitude of the site was determined from a hand-held Trimble GPS and was 40 degrees 04.34 minutes north and 110 degrees 56.82 minutes west respectively. The elevation of the site was approximately 8,850 feet MSL (refer to CHART I). The crash site was slightly upslope along the east face of a drainage oriented approximately northeast/southwest. Although the upsloping terrain was heavily forrested, open areas free of trees existed along the base of the drainage (refer to photograph 01 and CHART III).

The main fuselage was observed lying on its upper right side, in between the trunks of several large conifer trees (refer to photograph 02). All four main-rotor blades were located at or adjacent to the main fuselage and were observed to have remained attached to the main rotor hub assembly, and the longitudinal axis of the fuselage was oriented along an approximate 040/220 degree magnetic bearing line (refer to photograph 03). The entire tail boom assembly and tail rotor were observed to be separated from the fuselage (refer to photograph 04).

The tail boom and tail-rotor assembly were located approximately 55 feet west of the fuselage (refer to photograph 05). The tail rotor was complete except for approximately 75% of one blade which was separated. The separated blade section was located lying on the ground near the base of topped trees and approximately 50 feet southwest of the fuselage (refer to photograph 06). The blade exhibited minimal leading edge damage. The opposing blade exhibited a 90 degree folding bend just outboard of the blade grip and minimal leading edge damage (refer to photograph 07).

The four main-rotor blades were subsequently detached from the main-rotor hub assembly. All four blades displayed extensive bending deformation but were continuous from hub attach point to their respective tips (refer to photographs 08 through 11).

A number of conifer trees exhibited impact marks or were topped. The trees were generally oriented southwest of the fuselage and located 45 to 55 feet distant. These trees had impact/topping marks at elevation from 41 feet up to 76 feet above ground (refer to DIAGRAM I and composite photograph 12).

MEDICAL AND PATHOLOGICAL INFORMATION

Post mortem examination of pilot Thorne was conducted by Todd C. Grey, M.D, at the facilities of the Office of the Medical Examiner, 48 North Medical Drive, Salt lake City, Utah, 84113, on August 3, 1994. The cause of death was reported as "multiple blunt force injuries."

Tissue and fluid samples from pilot Thorne were submitted to the Armed Forces Institute of Pathology, Department of Defense, for toxicological evaluation. All tests conducted were negative (refer to attached Toxicology report).

TESTS AND RESEARCH

The previously referenced digital-to-audio recording transcription was subjected to an acoustical sound spectrum study by the NTSB's Office of Research and Engineering. The study revealed normal engine operation until 1850:05 (dispatch clock time) at which time a reduction to approximately 79% of the input driveshaft RPM was noted (refer to attached report).

The engine was shipped to the facilities of National Airmotive, Oakland, California, and disassembled and inspected on September 26, 1994. The disassembly revealed fused aluminum within the turbine assembly and minor rubbing (abrading) of the aluminum impeller shroud (diffuser). Additionally, small amounts of burned wood and debris were observed within the first stage turbine blades.

The fuel nozzle was noted to have carbon buildup on the air shroud (ejection side) with several of the holes blocked. The fuel nozzle was subsequently tested and found to meet all test specification limits (refer to attached portions of the Allison Engine Teardown Investigation Report).

ADDITIONAL INFORMATION

The Utah Department of Public Safety formally requested by letter on August 3, 1994, that the National Transportation Safety Board conduct a full public investigation of the accident. The investigator in charge launched at 1130 hours PDT on that date. On site examination of the wreckage was conducted on August 3, 1994, after which the aircraft was conditionally released for the purpose of transport to Salt Lake City. Further examination of the wreckage was accomplished on September 21, 1994, after which the wreckage, excluding the engine, associated components and selected lights and instruments were verbally released to the owner. Formal wreckage release of all retained wreckage was executed on March 30, 1995 (refer to attached NTSB Form 5120.15).

Pilot Information

Certificate:	Commercial	Age:	52,Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	
Instrument Rating(s):	Helicopter	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 2 Valid Medicalno waivers/lim.	Last FAA Medical Exam:	July 21, 1994
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	2514 hours (Total, all aircraft), 425 hours (Total, this make and model), 1838 hours (Pilot In Command, all aircraft), 87 hours (Last 90 days, all aircraft), 43 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	HUGHES	Registration:	N12UT
Model/Series:	OH-6A OH-6A	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:		Serial Number:	65-12953
Landing Gear Type:	Skid	Seats:	3
Date/Type of Last Inspection:	July 1, 1994 Continuous airworthiness	Certified Max Gross Wt.:	2550 lbs
Time Since Last Inspection:	20 Hrs	Engines:	1 Turbo shaft
Airframe Total Time:	2549 Hrs	Engine Manufacturer:	ALLISON
ELT:	Not installed	Engine Model/Series:	T63-A-700
Registered Owner:	UTAH DEPT OF PUBLIC SAFETY	Rated Power:	317 Horsepower
Operator:		Operating Certificate(s) Held:	None
Operator Does Business As:		Operator Designator Code:	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Unknown	Condition of Light:	Dav
conditions at Accident Site.	Onknown	Condition of Light.	Day
Observation Facility, Elevation:	PVU ,4491 ft msl	Distance from Accident Site:	36 Nautical Miles
Observation Time:	18:54 Local	Direction from Accident Site:	268°
Lowest Cloud Condition:	Scattered / 200 ft AGL	Visibility	3.5 miles
Lowest Ceiling:	Broken / 4400 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	17 knots / None	Turbulence Type Forecast/Actual:	/
Wind Direction:	120°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	22°C / 15°C
Precipitation and Obscuration:	No Obscuration; No Precipita	tion	
Departure Point:	SALT LAKE CITY (SLC)	Type of Flight Plan Filed:	Company VFR
Destination:		Type of Clearance:	None
Departure Time:	17:26 Local	Type of Airspace:	Class G

Airport Information

Airport:		Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:	0	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:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	40.490139,-111.840339(est)

Administrative Information

Investigator In Charge (IIC):	Mccreary, Steven
Additional Participating Persons:	TOM RETTBERG; SALT LAKE CITY , UT JACK A MITTEER; MESA , AZ JEFFREY W EDWARDS; INDIANAPOLIS , IN
Original Publish Date:	September 24, 1995
Last Revision Date:	
Investigation Class:	<u>Class</u>
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=41826
Persons: Original Publish Date: Last Revision Date: Investigation Class: Note: Investigation Docket:	JACK A MITTEER; MESA , AZ JEFFREY W EDWARDS; INDIANAPOLIS , IN September 24, 1995 Class https://data.ntsb.gov/Docket?ProjectID=41826

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