



National Transportation Safety Board Aviation Accident Final Report

Location:	WINSLOW, Washington	Accident Number:	SEA95FA214
Date & Time:	September 11, 1995, 05:30 Local	Registration:	N1WC
Aircraft:	Agusta A109A II	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

The helicopter pilot took off at night on a positioning flight for an emergency medical service (EMS) operation. There were reports of a low overcast layer varying from 1,000 feet above ground level to the surface. The majority of the witnesses reported that the helicopter was flying low as it traveled over the ground and continued over water toward a nearby island. Subsequently, the helicopter collided with the water and sank. Several of the witnesses reported that the engine sounded normal until the helicopter crashed. Some witnesses reported a 'popping' sound or a 'laboring' sound from the engines; however, after the engines were recovered at a later date, no evidence of a preimpact mechanical failure or malfunction was found. Local residents reported that the water condition at the time of the accident was 'calm' or 'glassy.' Several small pieces of the fuselage and main rotor blades were found floating on the surface of the water. Examination revealed that 3 of the main rotor blades had separated approximately three feet out from the attach points. The fourth blade separated approximately seven feet out from the attach point; however, the blade was bent and cracked chordwise approximately three feet out from the attach point. Using side scan sonar, wreckage was found over a distance of approximately 600 feet. The landing gear was found in the extended position, and the engine power levers were found in the flight position. Also, torsional evidence was found on the tail rotor driveshaft.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot failed to maintain sufficient altitude/clearance above the surface of water, while flying over calm water conditions at night. Factors relating to the accident were: darkness, low ceiling, fog, glassy (calm) water conditions, and the lack of visual cues for visual perception of altitude.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: CRUISE

Findings

1. (F) LIGHT CONDITION - DARK NIGHT
2. (F) WEATHER CONDITION - LOW CEILING
3. (F) WEATHER CONDITION - FOG
4. (F) TERRAIN CONDITION - WATER, GLASSY
5. (F) VISUAL/AURAL PERCEPTION - PILOT IN COMMAND
6. (F) VISUAL ILLUSION - PILOT IN COMMAND
7. (C) ALTITUDE/CLEARANCE - NOT MAINTAINED - PILOT IN COMMAND

Factual Information

HISTORY OF FLIGHT

On September 11, 1995, at 0530 Pacific daylight time, an Agusta A109A II, N1WC, registered to Signet Leasing and operated by Hospital Air Transport as a 14 CFR Part 91 positioning flight, collided with the water approximately one mile off the shoreline of Bainbridge Island, near Winslow, Washington. Visual and instrument meteorological conditions prevailed at the time and a company visual flight rules flight plan was filed. The helicopter sank in approximately 750 feet of water and was destroyed. The commercial pilot and two flight nurses were fatally injured. The helicopter had departed from Boeing Field, Seattle, Washington, at 0526, and was en route to pick up a woman in labor on Bainbridge Island to transport her to a hospital in Seattle.

At approximately 0500, an individual from the Bainbridge Fire Department reported that he heard over his radio that the Bainbridge Island Fire Department was dispatched to a woman in labor. Approximately 10 minutes later, he heard a call go out to Airlift Northwest to check on their availability.

At 0526, the air traffic controller, on duty at Boeing tower, reported that the pilot notified the tower that he (the pilot) was at "pad two" for departure westbound. The controller cleared the pilot for takeoff to the west. The controller reported that he notified the pilot that the wind was from 40 degrees at six knots, and the altimeter was 30.15" Hg. The controller stated that the takeoff appeared normal and that there was no further contact with Boeing tower.

At 0540, the dispatcher from Airlift Northwest called the tower and reported that they had not had any communications with the pilot. The controller then checked with Seattle Tracon, who also reported that they had had no contact with the pilot.

Statements prepared by EMT/firefighter personnel on Bainbridge Island, reported that they had heard the helicopter approaching the island. One individual reported that the engines and the rotors sounded normal before a sudden "boom" followed by complete silence was heard. Two other individuals reported hearing the helicopter approach, as it normally does from the east, and then there was a loud "thump" or "muffled explosion" heard.

At 0538, the Bainbridge Island Police Department was notified by a citizen who stated that they heard what sounded like "a boat hit something in the water." The Bainbridge Fire and Police were dispatched for a possible water rescue outside of Eagle Harbor. Rescue personnel reported that as they were leaving the docks, they notified the crew of the outgoing 0535 ferry boat of the water rescue. The responding individual on the ferry boat reported that they were half-way across the channel, and that they did not observe anything unusual. The individuals on the rescue boat reported that as they were heading out of the harbor, the water was glassy calm, and that they could see across the Puget Sound to the east at Seattle. As the search continued, the fog began to settle closer to the surface.

During the search, the rescue teams were notified that an Airlift Northwest helicopter was

overdue. The search continued and at approximately 0640, the outgoing 0620 ferry boat notified the Coast Guard of the possible crash site. It was reported that there was a strong odor of fuel and an oil slick was present, along with floating debris on the water surface. Search personnel responded to the site and recovered the bodies of the two flight nurses and assisted in retrieving the floating debris.

Excerpts from witness statements from individuals located on Bainbridge Island reported:

"Was awakened by approaching helicopter, then heard a muffled explosion. Did not hear any unusual power changes to believe engine trouble prior to impact. The weather at the time was haze or light fog. I could see no horizon looking ESE toward Duwamish Head (west Seattle, Elliott Bay) or west Seattle."

"Was awakened by the familiar sound of a helicopter coming from Seattle toward Bainbridge Island. The sound became louder, which is typical of the helicopters I've heard before. I estimated hearing the sound for only a few seconds before I heard a very distinct collision sound. It was fairly loud, not an explosion, but rather like a car hitting a tree. The engine sound disappeared simultaneously with the collision. The water was flat calm, no waves at all. It was quite foggy, not very light yet, and my vision was very limited. I estimate I could see several hundred yards (maybe a half mile or so), but could not see the lights from Seattle."

"Heard loud engine noise followed by a "whump" sound typical of a boat hull hitting a wave. Then all was silent. Went to window. The morning was still dark and a thick cloud ceiling hung about 300-500 feet over the water. I recall seeing lights of downtown Seattle, of the Duwamish Head and of Yeomalt Point (northeast of Winslow, Bainbridge Island) under the overcast. The sound heard prior to the impact was not the typical beat of the Airlift Northwest helicopter, but rather a louder, harsher "popping" sound lasting about two seconds. The noise continued until the sound of the hull striking the water."

"Heard the helicopter coming for 2 or 3 minutes. It was running perfectly at high rpm with no change whatsoever in rpm. Then there was a significant "pop" - not an explosion - and then silence. The weather was foggy that morning."

Excerpts of witness statements from individuals located near Seattle reported:

"Something wrong with the sound. Assumed flying low because of the overcast or fog."

"Heard aircraft directly overhead approximately 150-200 feet above ground level. Engine did not sound intermittent. When I saw it, it was 50 feet above ground level over Puget Sound. Watched with binoculars and saw anti-collision lights, strobes working and helicopter was straight and level, then it disappeared. No explosion or erratic attitude. Presumed it was controlled flight into water. Fog was at 200 feet above ground level. Helicopter was under it. It was dark and water very smooth."

"Heard loud, deep roar that seemed laboring while moving very slowly. Very loud after passing over the house at a very low level. Didn't sound like other helicopters that flew over the house. Weather was foggy."

"Helicopter at or about 500 feet above water level and fast and low. Base of overcast at 1,000 feet. Helicopter exhibited no obvious problems. The engine sounded fine and exterior lights were on."

"Heard helicopter and looked out window. Helicopter was approximately 340 feet above ground level flying full speed NNW. Watched until over Alki Point lighthouse (west Seattle). Helicopter was descending slightly to about 300 feet. Observed medical helicopters before and this sounded 100% normal with no mechanical problem."

"Heard helicopter approach and sounded lower than any previous heard before. Shook the house. Ground fog at time of the flight and visibility was less than 1,000 feet."

PERSONNEL INFORMATION

At the time of the accident, the pilot held a commercial pilot's certificate with rotorcraft and rotorcraft instrument ratings. The pilot's total flight time was estimated at 3,056 hours, with 51 total flight hours in the Agusta A109A. Flight records provided by personnel from Hospital Air Transport, indicated that the pilot had been an Aeromedical Evacuation/Maintenance Test Pilot for the Army military service until he was retired from active service. The pilot's records indicate that the last military flight was dated July 1993. There was no flight time reported until the pilot was hired by Hospital Air Transport on July 1, 1995. The pilot was qualified as pilot-in-command in the Agusta A109A on July 21, 1995, after completing 15 hours of flight time, which included eight hours for instrument proficiency. During the 90 days prior to the accident, the pilot had completed 51 total flight hours, with 14 hours during night-time operations. There was no actual instrument flight time indicated after the July 21, training flights.

METEOROLOGICAL INFORMATION

Just prior to, and at the time of the accident, witnesses reported varying weather conditions. The witnesses who made reference to the weather conditions on both the Seattle and Bainbridge Island side of Puget Sound, reported a dark night with overcast and foggy conditions. Depending upon the witness location, the weather varied from 1,000 feet above ground level and low level visibility across the Puget Sound to the other shore; to ground level fog and visibility less than 1,000 feet.

At 0526, the time the helicopter took off from Boeing Field, the controller reported the wind from 40 degrees at six knots. The altimeter setting was reported as 30.15" Hg.

At 0445, Boeing Field, the nearest weather reporting facility, was reporting a measured overcast at 1,300 feet. Visibility was reported as ten miles. The temperature was 59 degrees, and the dew point was 56 degrees. The wind was calm and the altimeter was 30.15" Hg.

At 0545, Boeing Field was reporting scattered clouds at 1,000 feet, and a measured overcast ceiling at 1,500 feet. Visibility was reported as seven miles. The temperature was 58 degrees, and the dew point was 56 degrees. The wind was from 30 degrees at five knots. The altimeter

was reported as 30.16" Hg.

WRECKAGE AND IMPACT INFORMATION

The helicopter collided with the water of Puget Sound approximately one mile off the shoreline from Bainbridge Island. Side-scan sonar located the wreckage at approximately 750 foot depth. Several pieces (large and small) of wreckage debris were scattered over a field of approximately 600 feet, by 150 feet.

Floating debris was recovered on the day of the accident by the Bainbridge Police and Fire Departments. The debris was moved to a secured location for parts identification and wreckage reconstruction. The items recovered included sections of the fuselage belly, forward of the rear seats. No sections of the side structure above the lower door frame and lower section of the door were recovered at this time. The right side cyclic control and the rudder pedal assembly were inspected and found that the cyclic control had been sheared from the lower attach points. Small sections of the interior cabin floor were identified as located from the left side of the floor where the gurney attaches to the floor. Both main gear doors were sheared from their attach hinges. No other damage was noted to either door. Only small sections of the nose gear door were identified. A small section of the lower vertical stabilizer was identified as a section of the leading edge. Sections of the engine cowling were identified as located at the forward lower left side and the aft cowling for the engine and transmission. Several items of interior medical equipment, seat cushions, and sections of cockpit panels were also recovered.

Sections from all four main rotor blades were recovered. Each blade separated from the main rotor assembly, outboard of the attach points. The blades were placed next to one another and numbered one through four for identification purposes (see attached photos). Blades one through three separated approximately three feet from the attach point, while the fourth blade separated at approximately seven feet.

Blade one remained in one long piece, minus the tip, outboard of the initial separation point. The blade was bent in half and slightly aft. The trailing edge side of the blade was cracked chordwise approximately three feet, five inches from the initial separation point.

Blade two was broken in two pieces, minus the tip, outboard of the initial separation point. The break was at approximately two feet, nine inches from the initial separation point. Two trailing edge side chordwise cracks were measured from the initial separation point approximately four feet, ten inches; and approximately six feet, five inches. The blade was bent slightly aft.

The entire length of blade three was not recovered. The sections that were recovered were a four foot section starting at three feet from the attach point, and a one foot section of the trailing edge side near the tip of the blade. A trailing edge chordwise crack was measured at approximately three feet from the initial separation point.

The entire length of blade four was not recovered. The sections recovered started at approximately seven feet from the attach point. The next seven feet of the blade was broken in

two pieces. The first piece was approximately three feet in length and the other was approximately four feet in length. A small section of the trailing edge near the tip was recovered.

The remainder of the wreckage was recovered by the Naval Undersea Warfare Center Division, Keyport, Washington, on April 11 and 12, 1996, seven months after the accident. A Cabled Underwater Recovery Vehicle (CURV) II-A was used to grip pieces of the wreckage, via mechanical arms, to bring the debris to the surface. When the debris was near the surface, divers then attached cables and ropes to the wreckage for hoisting onto the deck of the vessel. Additional damage to the wreckage was noted during the recovery effort.

Wreckage that was recovered on April 11 and 12, included the tail boom, both engines still mounted in the engine compartment, the main rotor mast with inboard sections of the main rotor blades still attached, the cockpit overhead panel and cockpit center console panel, main landing gear and sections of the fuselage structure.

Examination of the remainder of the fuselage upper deck, which extended from the station of the cockpit aft bulkhead, all the way to the aft of the oil cooler-blower installations. The air conditioner condenser-evaporator installation remained in place with the related blowers. The oil and hydraulic fluid reservoirs, the hydraulic modules and the accumulators did not reveal any abnormalities. The transmission mounts remained in place. The lower and upper fittings remained in place, however, the upper and lower transmission case was completely eroded away. The hydraulic pumps were intact, with the lines still connected and both shafts rotated easily. The number one segment of the tail rotor drive shaft was sheared at the front end, with evidence of torsion loading and rotational contact with the forward engine firewall. The aft Thomas coupling were in place with the splined adapter inserted and attached to a section of the number two shaft. The coupling leaves are distorted by torsion loads.

The number two engine mount was in place, however, the engine gearbox was completely corroded away. The position of the engine controls could not be determined. The forward Thomas couplings displayed evidence of torsion loading in the direction of the applied engine torque. The bleed valve was found in the open position. The number two blower shaft was in place and the adapters were intact. The number 2 blower input shaft was sheared at the beginning of the splined area, and the blower could not be rotated by hand. The number one engine was found in a similar condition as the number two engine. The heater shut-off valves were found in the open position, and the cross-feed valves were closed.

The tail boom separated from the forward structure. The number three tail-rotor driveshaft sections appeared to be intact, with all bearings in place and free to rotate. The dust covers were in place and the slippage marks were visible and intact. The elevators were connected to the torque tube. Recovery damage was noted. The 90 degree gearbox was in place. The input shaft and pinion assembly were in place with the bearings intact. The gearbox case was completely dissolved away. The upper vertical fin was intact and straight. The number three bearing support was sheared off, however, the retaining bolts were still in place and safety wired. The tail-rotor hydraulic actuator was in place and connected. The autopilot tail-rotor actuator was connected with the output rod in place. The tail-rotor blades remained attached. One blade was bent in-half, while the other blade remained straight.

The two flight control rods in the tail boom were in place. The four tail-boom connecting bolts were in place. The two upper longerons on the fuselage side were intact and straight; the two lower ones were sheared forward of the attachment fittings. The lower structure of the transition area was disintegrated.

The main rotor head remained attached to the mast, with the entire pylon installation, swashplate, servo-actuators and rotor controls. The mast still carried the lower bearing, with the retaining flange in place. The upper transmission case was completely corroded away. Two of the three servo-actuators were connected to the stationary swashplate. The separated servo-actuator was sheared at the base of the threads that engaged the upper rod end (see attached metallurgical report). All lower fittings were attached to the actuators. The control linkages to the pilot valves were connected and the pilot valves appeared intact and free to move along the longitudinal axis. The swashplate would not rotate by hand due to corrosion of the duplex bearings. The main rotor hub displayed damage to the lead-lag and flap hinges, as all were displaced beyond their allowable travel. The yellow rotor blade damper was missing, and its attachment point was bent and sheared. The yellow, red and blue main rotor blades were sheared at the end of the root doublers, with evidence of overload indication noted. The stationary swashplate scissors link was intact and remained connected to the lower fitting. The rotor scissor link was intact and in place. (Note, during wreckage recovery, straps were attached to one of the remaining main rotor blades and around the mast assembly. During the hoisting process, and as the wreckage was breaking the surface, it was noted that the upper deck and engines were also attached. As the hoisting continued, the upper deck and engines broke away from the mast assembly and sank. Additional damage to the mast assembly was possible. See attached photos).

The main landing gear was examined and noted that the landing gear was in the down and locked position. The nose landing gear was extended. The landing gear lever was found in the "up" position

Both engines remained within the engine compartment. The gearbox was completely corroded away and the gears were sitting on the compartment floor. Both engines were severely corroded and were internally caked with mud. During the disassembly process, neither engine displayed evidence of a mechanical failure or malfunction. The fuel control and governor shafts were found to rotate freely on both engines. Fuel was found in the fuel lines and in the lines to the fuel nozzle. The fuel filters appeared clean of debris and the bleed valves moved in a normal manner.

The cockpit overhead panel was found sheared at the forward and aft end. The pitot tubes remained connected and were bent rearward and to the left. The number one engine power lever was sheared at its base and in the flight position. The number two lever was intact and was also found in the flight position.

MEDICAL AND PATHOLOGICAL INFORMATION

The pilot's remains were never recovered.

TESTS AND RESEARCH

The piston rod of one servo, that was found separated during the wreckage examination, was sent to the National Transportation Safety Board, Washington D.C., Materials Laboratory for metallurgical examination. The specialist reported that stereo microscopic viewing of the piston rod fracture disclosed fracture features that were brittle but fairly uniform in texture throughout the fractured cross section, and that there was no evidence of crack arrest positions anywhere on the fracture.

ADDITIONAL DATA

The wreckage was released to the owner's representative on May 6, 1996. The wreckage was stored at Northwest Salvage, Alger, Washington. The main rotor mast assembly was returned to Northwest Salvage in February 1996, at the completion of the metallurgical examination.

Pilot Information

Certificate:	Commercial	Age:	42, Male
Airplane Rating(s):	None	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	
Instrument Rating(s):	Helicopter	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim	Last FAA Medical Exam:	June 27, 1995
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	3056 hours (Total, all aircraft), 51 hours (Total, this make and model), 51 hours (Last 90 days, all aircraft), 19 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Agusta	Registration:	N1WC
Model/Series:	A109A II A109A II	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	7278
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	September 10, 1995 100 hour	Certified Max Gross Wt.:	5730 lbs
Time Since Last Inspection:	1 Hrs	Engines:	2 Turbo shaft
Airframe Total Time:	3909 Hrs	Engine Manufacturer:	Allison
ELT:	Installed, not activated	Engine Model/Series:	250 C20B
Registered Owner:		Rated Power:	420 Horsepower
Operator:		Operating Certificate(s) Held:	On-demand air taxi (135)
Operator Does Business As:	AIRLIFT NORWEST	Operator Designator Code:	PITA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Unknown	Condition of Light:	Night/dark
Observation Facility, Elevation:	BFI ,18 ft msl	Distance from Accident Site:	9 Nautical Miles
Observation Time:	05:45 Local	Direction from Accident Site:	100°
Lowest Cloud Condition:	Unknown	Visibility	
Lowest Ceiling:	Overcast	Visibility (RVR):	
Wind Speed/Gusts:	5 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	10°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	14° C / 13° C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	SEATTLE , WA (BFI)	Type of Flight Plan Filed:	Company VFR
Destination:	, WA	Type of Clearance:	None
Departure Time:	05:26 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:	3 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	3 Fatal	Latitude, Longitude:	47.639442, -122.530853(est)

Administrative Information

Investigator In Charge (IIC):	Eckrote, Debra
Additional Participating Persons:	KEN ZIEMER; RENTON , WA PAOLO FERRERI; PHILADELPHIA , PA JAMES BARKHURST; SEATTLE , WA SCOTT SCHEURICH; INDIANAPOLIS , IN
Original Publish Date:	April 29, 1997
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=42067

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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](#).