



Aviation Investigation Final Report

Location:	Whitefish, Montana	Accident Number:	GAA15LA217
Date & Time:	August 4, 2015, 22:30 Local	Registration:	N43792
Aircraft:	MD HELICOPTER INC 369E	Aircraft Damage:	Substantial
Defining Event:	External load event (Rotorcraft)	Injuries:	1 Minor
Flight Conducted Under:	Part 91: General aviation - External load		

Analysis

The pilot reported that he was hovering over a lake at night while practicing water bucket operations. He was using the helicopter's landing light and newly installed movable searchlight positioned to shine underneath and toward the left side of the helicopter for illumination. He reported that he was able to see the shoreline, horizon, and the texture on the water during these operations. He reported that, during the third load, he transitioned his sight "forward and inside to the instrument panel" and that, while he was scanning the instrument panel, he "noticed the rotor disk dipping toward the water." The main rotor blades then struck the water, followed by the helicopter impacting the water. The cockpit filled with water as the helicopter rolled upside-down and began to sink.

The pilot reported that, while he was egressing from the cockpit underwater, he felt his "helmet tug backwards and...realized the communications cord was still attached to the helicopter." The pilot removed his helmet, surfaced, and swam to the shore without further incident. The helicopter was recovered from the lake, and an examination of the helicopter revealed substantial damage to the fuselage, the main rotor system, and the tail boom. The pilot reported that there were no preimpact mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation.

Probable Cause and Findings

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

The pilot's failure to maintain altitude and a level attitude while hovering over water at night during an external load operation, which resulted in the helicopter's main rotor contacting the surface of the water.

Findings

Personnel issues	Aircraft control - Pilot
Aircraft	Altitude - Not attained/maintained
Aircraft	Pitch control - Not attained/maintained
Environmental issues	Water - Effect on equipment
Environmental issues	Dark - Effect on operation

Factual Information

History of Flight

Maneuvering-hover	External load event (Rotorcraft) (Defining event)
Maneuvering-hover	Loss of control in flight
Maneuvering-hover	Collision with terr/obj (non-CFIT)
Post-impact	Evacuation
Post-impact	Sys/Comp malf/fail (non-power)

****This report was modified on March 17, 2016. Please see the docket for this accident to view the original report.****

On August 4, 2015, about 2230 mountain daylight time, a MD Helicopters 369E, N43792, impacted Beaver Lake during water bucket operations four miles northwest of Whitefish, Montana. The helicopter became submerged in the lake. The commercial pilot sustained minor injuries. The helicopter was registered to Two Bear Air 2 LLC, Whitefish, Montana, and operated by the pilot under the provision of 14 Code of Federal Regulations Part 91 as a personal flight. Night visual meteorological conditions prevailed and no flight plan was filed. The flight originated from private property on Lion Mountain, Whitefish, Montana.

The pilot reported that he was hovering over a lake at night while practicing water bucket operations. He was using the helicopter's landing light and newly installed movable searchlight positioned to shine underneath and toward the left side of the helicopter for illumination. He reported that he was able to see the shoreline, horizon, and the texture on the water during these operations. During the third load, he reported that he was transitioning his sight "forward and inside to the instrument panel," and that while he was scanning the instrument panel, he "noticed the rotor disk dipping toward the water." He stated that he saw the main rotor blades strike the water and then the helicopter impacted the water. The cockpit filled with water as the helicopter rolled upside-down and began to sink. The pilot reported that while he was egressing from the cockpit underwater, he felt his "helmet tug backwards and I realized the communications cord was still attached to the helicopter." The pilot removed his helmet, surfaced, and swam to the shore without further incident. The recovery of the helicopter from the lake revealed substantial damage to the fuselage, the main rotor blade system, and the tail boom.

The pilot reported there were no preimpact mechanical failures or malfunctions with the airframe or engine that would have precluded normal operation.

PERSONNEL INFORMATION

The pilot reported that he had prior formal external load training, but no formal over water external load training. He reported that he had never had formal underwater egress training. He also reported that he was not wearing a flotation device or carrying a self-contained breathing device during the over water flight.

AIRCRAFT INFORMATION

The helicopter did not have a flotation system installed at the time of the accident. The helicopter's manufacturer had optional emergency and utility flotation systems available for this helicopter.

The water bucket and suspension lines were directly connected to the cargo hook for the accident flight. The pilot suggested as a safety recommendation, to "increase length of attaching cable for external loads."

ADDITIONAL INFORMATION

Aviation Life Support Systems

The pilot was wearing an Evolution Helmets, LLC model 252 helmet during the flight. The helmet sustained no damage during the accident sequence. The helmet had a Bose Corporation A20 communications system installed. The Bose Corporation A20 Owner's Guide states in part; "Do not use the headset with a helmet or as part of a crash protection system. The headset is not intended for such use, and has not been certified for crash protection. Dismantling, reassembly, or modification of the headset, or any part, for use in a helmet or other crash protection system could result in severe bodily injury and such unauthorized use will void the limited product warranty."

The Federal Aviation Administration (FAA) has released Special Airworthiness Information Bulletin (SAIB) CE-16-08 concerning the use of noise cancelling headsets. The SAIB states in part:

"In many cases, pilots are using the noise cancelling headsets as supplementary equipment during operations. When wearing these headsets, the pilot may be unaware of environmental sounds and audible warning annunciations in the cockpit that do not come through the intercom system."

Additionally, the SAIB states:

"Become familiar with the safety information in FAA Information for Operators (InFO) 07001 and elect to find other solutions to discern such alarms or sounds, or discontinue using these headsets if any audible alarms or environmental sounds cannot be discerned while wearing a noise cancelling headset."

Currently, there are no federal or industry standards/requirements for helmet use in helicopters, or for helmet design and crashworthiness specifications when used in helicopters.

This model of helmet, with the Bose Corporation A20 system installed, did not have a quick disconnect assembly at the helmet, which would facilitate a clean break of the helmet from the intercom system (ICS) cord and the ICS receptacle.

The Transportation Safety Board of Canada has published an aviation safety advisory (2006) pertaining to the post-accident survivability of direct-to-airframe helicopter cord connections. The aviation safety advisory was based on a Messerschmitt-Bolkow-Blohm BO-105 accident (A05A0155) and states in part;

"After ditching or water impact, the occupants of a capsized helicopter are prone to disorientation. Therefore, unimpeded egress through any available exit is vital to survival. An attached communication cord that will not release cleanly may impede this egress."

MD Helicopters, Incorporated has released an operational safety notice, OSN2015-001 Helicopter Communication Cord Connection, and states in part;

"Use of an intermediate "pig-tail" communication cord can help to mitigate this safety hazard. Instead of plugging the helmet communication cord directly into the ICS receptacle, the helmet cord is instead plugged into one end of the intermediate cord, while the other end is plugged into the ICS receptacle. The helmet communication cord is then able to release cleanly from the intermediate cord receptacle as it is pulled in the direction of travel during egress."

Over Water Aviation Life Support Systems Requirements

14 Code of Federal Regulations (CFR) Part §91.205 Powered Civil Aircraft with Standard Category U.S. Airworthiness Certificates: Instrument and Equipment Requirements states in part;

"(12) If the aircraft is operated for hire over water and beyond power-off gliding distance from shore, approved flotation gear readily available to each occupant and, unless the aircraft is operating under part 121 of this subchapter, at least one pyrotechnic signaling device. As used in this section, "shore" means that area of the land adjacent to the water which is above the high water mark and excludes land areas which are intermittently under water."

§91.205 does not address helicopters that are operated for private use. Additionally, §91.205 does not specifically address operating off of or to water flights and hovering flights over water sources.

An example of a flight regulation that specifically addresses helicopters in these two modes of flight is the National Wildfire Coordinating Group's Interagency Helicopter Operations Guide (IHOG), last published in 2013. Chapter 9: Equipment Requirements and Maintenance, IV. Survival Equipment, A. Over Water Flotation and Survival Equipment, states in part;

"Approved Personal Flotation Devices (PFD). Shall be worn by each individual on board the helicopter when conducting operations beyond gliding distance to shore, operating off of or to water and during all hovering flights over water sources such as ponds, streams, lakes, and coastal waters."

The FAA Helicopter Flying Handbook (FAA-H-8083-21A) does not address specific over water survival gear recommendations or requirements.

The FAA Helicopter Instructor's Handbook (FAA-H-8083-4) states for a flight instructor to, "discuss the requirements" of 14 CFR Part §91.205. However, there are no specific over water survival gear recommendations or requirements listed.

FAA Advisory Circular 120-47 Survival Equipment for Use in Over Water Operations was last published in 1987. While not regulatory in nature, this document addresses some recommended over water survival equipment.

Over Water Operations

The U.S. Army has published Field Manual 3-04.203 Fundamentals of Flight (2007). This manual provides information on over water flight operations for helicopters. This manual states in part;

3-190. Conducting flight in over water operations usually includes lack of visible horizon due to overcast skies, restricted visibility, difficulty in detecting altitude above water, water spray coating the windscreen, and the potential for spatial disorientation.

4-138. Water is the most difficult surface over which to hover as it is nearly absent of visual reference points. If possible, the aircraft should be maneuvered near some object, such as a tree stump, ChemLight, or buoy, to provide a reference point. If waves are present, the aviator tends to move laterally with the waves. Accurate height estimation requires use of a radar altimeter when hovering over water.

Pilot Information

Certificate:	Commercial; Private	Age:	37, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	4-point
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Without waivers/limitations	Last FAA Medical Exam:	August 27, 2014
Occupational Pilot:	No	Last Flight Review or Equivalent:	June 3, 2015
Flight Time:	(Estimated) 933 hours (Total, all aircraft), 367 hours (Total, this make and model), 862 hours (Pilot In Command, all aircraft), 58 hours (Last 90 days, all aircraft), 11 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	MD HELICOPTER INC	Registration:	N43792
Model/Series:	369E E	Aircraft Category:	Helicopter
Year of Manufacture:	2010	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	0601E
Landing Gear Type:	Skid	Seats:	4
Date/Type of Last Inspection:	July 23, 2015 100 hour	Certified Max Gross Wt.:	3550 lbs
Time Since Last Inspection:		Engines:	1 Turbo shaft
Airframe Total Time:	635.5 Hrs at time of accident	Engine Manufacturer:	Rolls-Royce
ELT:	C126 installed, not activated	Engine Model/Series:	250-C20R/2
Registered Owner:	On file	Rated Power:	425 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Night
Observation Facility, Elevation:	KGPI,2973 ft msl	Distance from Accident Site:	10 Nautical Miles
Observation Time:	03:55 Local	Direction from Accident Site:	142°
Lowest Cloud Condition:	Clear	Visibility:	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	3 knots / None	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	190°	Turbulence Severity Forecast/Actual:	/ N/A
Altimeter Setting:	29.87 inches Hg	Temperature/Dew Point:	18°C / 4°C
Precipitation and Obscuration:	Moderate - None - Smoke		
Departure Point:	Whitefish, MT	Type of Flight Plan Filed:	None
Destination:	Whitefish, MT	Type of Clearance:	None
Departure Time:	22:25 Local	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	1 Minor	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Minor	Latitude, Longitude:	48.433612,-114.418334(est)

Administrative Information

Investigator In Charge (IIC):	Hodges, Michael
Additional Participating Persons:	John D Russell; FAA Helena FSDO; Helena, MT
Original Publish Date:	April 26, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=91723

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).