National Transportation Safety Board
Office of Aviation Safety
Washington, DC 20594

ERA24FA003

OPERATIONS

Factual Report
October 8, 2024

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A. ACCIDENT

Location: Croydon, New Hampshire
Date: October 8, 2023
Time: 1932 eastern daylight time (local)
2332 UTC
Aircraft: Bell Helicopter Textron Canada, 407

B. OPERATIONS

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C. SUMMARY

On October 8, 2023, about 1932 eastern daylight time, a Bell 407 helicopter, N802JR, was involved in an accident near Croydon, New Hampshire. The commercial pilot was fatally injured. The helicopter was operated by JBI Helicopter Services under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a positioning flight.

1.0 Details of the Investigation

The operational factors were reviewed by the NTSB Investigator-in-Charge. This limited factual report provides an overview of the pilot in command, operator, relevant aircraft systems, and additional circumstances surrounding the accident flight.

2.0 History of Flight

According to the operator, on October 6, 2023, the accident pilot, in the accident helicopter, was conducting visual powerline patrols in the region of the accident site. Due to poor weather at the operator’s base near Pembroke, New Hampshire, the pilot elected to land on private property that had a large field and was known to company pilots as a safe area to land should weather prevent their return to base. The pilot was then picked up by car and ended his shift later that afternoon. The accident pilot did not work on the following day.

On October 8, 2023, about 1700, management personnel from the operator contacted the accident pilot and detailed a mission to be conducted the following day at Quonset State Airport (OQU), North Kingstown, Rhode Island. The mission involved a photo flight to commence on Monday, October 9, 2023. The pilot then drove his vehicle to the property where he had landed at on October 6. The accident flight was to be a Part 91 positioning flight to OQU, which was 115 miles south of the departure area.

According to the operator, at 1922 the helicopter became active on their flight tracking software. The first alert/indication on the tracking software was that battery power had been turned on to the helicopter.

Review of data recovered from an Appareo Vision 1000 Airborne Image Recording System showed that the helicopter took off about 1931:30, climbed vertically to about 500 ft above ground level, and began flying towards the northeast. About 30 seconds of flight data was recorded, which showed that the helicopter climbed toward the northeast to about 600-700 ft above ground level.

The helicopter then turned east and eventually southeast, and as the helicopter turned, it began descending while its ground speed gradually increased. The helicopter subsequently impacted trees and terrain about 600 feet southeast of the helicopter's last recorded position. Figure 1 provides an overview of the flight track, select callouts for time, altitude, and speed, as well as the wreckage location.

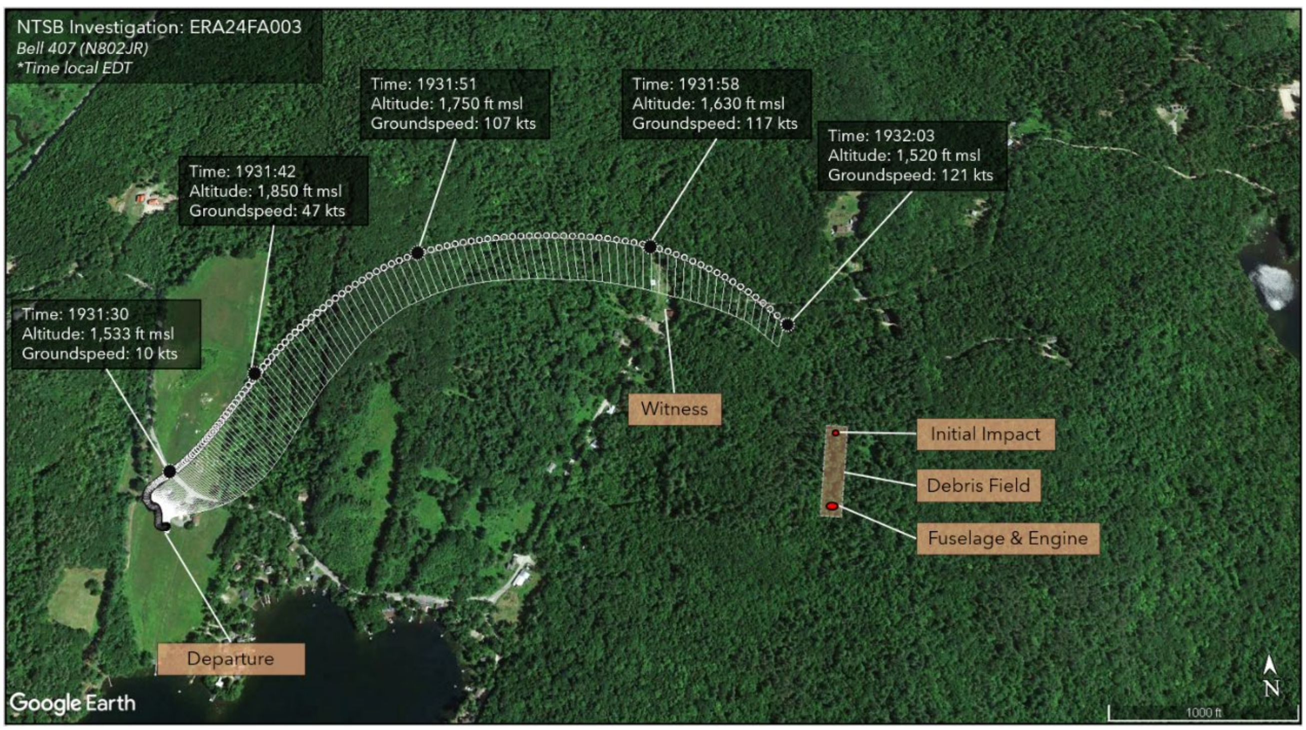

Figure 1: Overview of the flight track (white dots); callouts of the helicopter's position, speed and altitude (black dots); and wreckage location (red dots and shaded box).

According to a witness, who was located under the helicopters flight path, she heard the helicopter flying over her house, and described that "it was so loud" and "so low." She immediately went outside and saw a helicopter with its lights on and the engine was "very loud." The helicopter disappeared from her view and the sound of the helicopter abruptly stopped, but she did not hear the sound of an impact.

She recalled observing the stars after the helicopter flew by. She could not recall seeing the moon and described the night as a “dark night.” There was no wind, nor any rain or clouds that she observed.

Shortly after the accident occurred, the company personnel from the operator noticed that the helicopter was no longer broadcasting a position, and they immediately initiated a search and notified local authorities. The wreckage was located about 0200 on October 9, 2023.

D. AIRCRAFT INFORMATION

2.1 Bell Helicopter Textron Canada, 407

The Bell 407 is a four-blade, single-engine, seven-place helicopter equipped with a Rolls-Royce 250-C47B, 650 SHP, reverse flow turboshaft engine, serial number CAE-848246. The accident aircraft, serial number 53971, was manufactured in January 2010. According to the Hobbs meter the accident aircraft flight hours were 2,990.7. The engine had accumulated 2,781.9 hours.

2.2 Appareo Vision 1000

The helicopter was equipped with an onboard image recorder, an Appareo Vision 1000. The Appareo Vision 1000 is a self-contained image, audio, and data recorder. The device was mounted in the overhead panel in the cockpit. It records an image at a rate of four times per second with its internal camera. A GPS receiver is included that receives GPS satellite-based aircraft time, position, altitude, and speed. The device has a self-contained real-time inertial measuring unit that records 3-axis acceleration, and derived pitch, roll and yaw data.

The unit recorded data, audio, and images during the accident flight. Refer to the NTSB public docket for an image recorder specialist report detailing the findings.

2.3 S-TEC HeliSAS/ Autopilot System

The helicopter was equipped with a S-TEC HeliSAS/ Autopilot System in accordance with supplemental type certificate No. SR02344LA. The flight manual supplement stated in part that HeliSAS was a two-axis (pitch & roll) stability augmentation system (SAS) with autopilot. The attitude-command-attitude-hold SAS mode of the HeliSAS maintains helicopter attitude in all flight conditions by applying corrective inputs to the cyclic in order to maintain the commanded or reference attitude. The flight manual supplement further stated:

> *The HeliSAS SAS/Autopilot consists of two electromechanical servo-actuators, a flight control computer (FCC), a special panel-mounted analog attitude*

indicator or digital attitude heading reference system (AHRS)/ air data attitude heading reference system (ADAHRS) which provides the FCC with attitude information, two or three buttons on the cyclic stick, and interconnecting cables. The basic system provides only the SAS functions, and includes a SAS ON/OFF switch. The optional full system provides both SAS and autopilot functions, and includes a HeliSAS Control Panel (HCP). One servo-actuator controls pitch, the other controls roll, and both are connected to the cyclic through electromagnetic clutches. If the attitude source is from a remote ADAHRS, the Fast/Slave switch not used in flight, but is only used for maintenance functions.

When the SAS/autopilot is engaged, the FCC senses aircraft attitude, heading, angular rates and linear accelerations using a combination of sensors in the flight control computer and attitude gyro and directional gyro, or AHRS. Airspeed and altitude information is obtained from the aircraft pitot/static system. The FCC sends signals to the servo-actuators to apply small corrections to the cyclic as required to maintain the commanded or reference attitude.

The supplement provided a CAUTION noting:

SAS is intended to enhance safety by reducing pilot workload. It is not a substitute for adequate pilot skill nor does it relieve the pilot of the responsibility to maintain adequate outside visual reference.

The SAS system could be selected ON or OFF with a push button located in the cockpit and on the autopilot. Figure 2 provides an exemplar SAS on or off push button.

Figure 2: HeliSAS SAS ON/SAS OFF Switch

The figures below provide an exemplar view and accident helicopter view of the HeliSAS Control Panel (HCP) that is incorporated with the autopilot. The exemplar HCP panel below reflects a SAS "green" status indicating SAS is engaged. A white light above the SAS selection button indicates that the mode is not engaged and is in a standby mode ready to be engaged. In the exemplar photo, the HCP also has an engaged altitude (ALT) mode on.

Figure 3: Exemplar HeliSAS Control Panel (HCP)

Figure 4: View of the accident helicopter HCP.

The flight supplement provided normal procedures for the SAS Mode. The supplement stated in part:

> *Observe that SAS ON/OFF button is solid amber or the SAS LED on HCP is white, indicating that SAS is in standby mode.*
>
> *SAS may be engaged prior to liftoff, throughout landing, and at any airspeed. Engage SAS by pressing SAS button (on instrument panel or HCP) or holding FTR button on cyclic for at least 1.25 seconds.*
>
> *SAS may be disengaged by pressing SAS button (on instrument panel or HCP) or AP DISC button on cyclic.*
>
> *If autopilot modes are engaged, the AP DISC button must be pressed twice or held for at least 1.25 seconds to disengage SAS.*
>
> *Safety monitors automatically disengage the SAS/autopilot if a malfunction is detected. Automatic disengagement of an autopilot mode while the SAS remains functional is indicated by a single beep in the headset. Automatic or intentional disengagement of the entire system is indicated by four beeps in the headset.*

The supplement provided normal operation overview for the SAS. The supplement stated in part:

Normal Operation

The SAS performs a self test and enters standby mode during aircraft start and warm-up. Standby mode is indicated by annunciation of the white LED light above the SAS mode button on the HCP. The HCP mode LEDs alternate between white and green during power-up and self test. An aural warning test (four headset beeps) is part of the self test.

Once the system is in standby mode and while still on the ground and wearing the headset, the system should be engaged with cyclic friction off. The cyclic should exhibit a centering tendency. Disengage the system using the AP DISC button on the cyclic and note 4 beeps in the headset. Note that the cyclic forces are nearly zero with the system disengaged.

HeliSAS is intended to be active or in standby mode at all times. This is to ensure that the SAS can be quickly engaged if needed.

HeliSAS may be engaged at pilot's discretion using the HCP SAS mode button. An white OFF indication turns to green ON when the system is engaged. If the HCP is installed, HeliSAS may be engaged at the pilot's discretion using the HCP SAS mode button. A white indication on the SAS LED turns green when the system is engaged. The SAS may also be engaged by pressing the force-trim-release (FTR) button on the cyclic grip for more than 1.25 seconds.

Additional autopilot modes may be engaged using the other HCP mode buttons (if installed), but only when indicated airspeed is greater than 44 KIAS.

The SAS may be used throughout the flight envelope (including hover and autorotation) at pilot's discretion.

When the SAS is engaged while airborne, it will maintain the pitch and roll attitude at the time of engagement within the following limits. The system will not trim to pitch attitudes greater than 6 degrees nose-down, 11 degrees nose-up, and 5 degrees bank. If the system is engaged with the helicopter in a large pitch or roll attitude, it will fly the helicopter to a nearly level attitude. After SAS engagement, the reference attitude may be adjusted using the FTR button on the cyclic grip. The system will maintain the attitude at which the trim button is released, within the above limits.

NOTE

The SAS should always be in standby mode when it is not engaged. This allows immediate engagement if required.

2.4 S-TEC HeliSAS/ Autopilot System – System Status

Review of the onboard image recorder found that during the takeoff and initial climb, the SAS system was not activated and remained in a white standby mode throughout the flight.

E. THE OPERATOR

The operator was Joe Brigham Inc., d.b.a., JBI Helicopter Services. The operator held certificates for Rotorcraft External Load Operations (Part 133), On-Demand Air Taxi (Part 135), and Agricultural Aircraft (Part 137). The accident flight was conducted as a Part 91 positioning flight.

F. PILOT IN COMMAND

2.1 Certificates and Ratings

According to FAA airman records, the commercial pilot held ratings for airplane single-engine land and sea, in addition to multi-engine land. He also held ratings for rotorcraft helicopter, instrument airplane and helicopter. He held a flight instructor certificate, with ratings for airplane single and multi-engine, and rotorcraft helicopter. On October 19, 2022, he was issued a second-class medical certificate, with an interim issuance denoting it was not valid for any class after October 31, 2023.

2.2 Flight Experience, Recent Proficiency Checks

The following hours for the PIC were provided by the operator via the NTSB Pilot/Operator Aircraft Accident/Incident Report 6120.1 form. The table below reflects areasIf the flight hours were he table below provides a denoting of flight experience that was Not Reported (NR) by the operator.

Flight Time	All Aircraft	This Make and Model	Rotorcraft
Total Flight Hours	13780	1377	12560
Total Flight Hours PIC	13699	1377	NR
Total Night Hours	318	NR	NR
Previous 90, 30 days, 24hrs Night Hours	NR	NR	NR
Hours, Previous 24 hours	138	65	138
Hours, Previous 30 days	64	22	64
Hours, Previous 90 days	.2	.2	.2
*Not Reported (NR)			

The PIC completed his most recent Part 135.293 and 135.299 airman competency/ proficiency check on March 22, 2023. The check was satisfactory. The remarks noted that the following conditions and procedures were evaluated: flat light, white out/ brown out, RNAV 17 KCON Airport, IMC, unusual attitude recovery, hydraulic off, FADEC Fail. Operator records found that the pilot completed his initial airman/ competency check in the accident helicopter on April 6, 2016.

2.3 Check Pilot Interview

The operator's check pilot who completed the most recent 135 proficiency check with the accident pilot was requested to provide additional details and circumstances pertaining to the evaluation and his flight experience with the accident pilot.

The check pilot explained that the evaluation of the white out and brown out conditions was a verbal discussion during preflight, given it is far too dangerous to seek out those conditions. He said the accident pilot explained a description of what he would do satisfactorily.

The check pilot reported that unusual attitude recoveries were evaluated. He placed the helicopter in an unusual attitude and transferred controls back to the accident pilot. The accident pilot recovered satisfactorily. He recalled that he did not use the HeliSAS system, and the recovery was made in visual meteorological conditions without any vision reducing equipment (i.e., the accident pilot was not wearing a view limiting device, nor was he required to be). The check pilot further explained that for proficiency checks, all equipment on-board must be airworthy, but it is up to the pilot on what equipment they actually want to use during the flight (e.g., autopilot, HeliSAS equipment, etc.).

The check pilot was asked to explain his knowledge and experience with the HeliSAS, given his experience in the accident helicopter. He explained that there are two ways to engage the HeliSAS, either on the cyclic via a button, or on the autopilot mode control panel. He explained that when you engage the system, it will level the helicopter from an unusual attitude. He explained that it works similar to an airplane wings leveler button. He explained that based upon his experience, he has used the SAS feature, and he knows other pilots that have used it.

He did not observe the accident pilot utilizing the HeliSAS feature in their check, however, he noted that the initial checkride the accident pilot completed in 2016 on the Bell 407, the remarks denoted satisfactory performance with the use of autopilot.

2.4 Pilot in Command, 72 Hour History Review

The pilot's spouse was requested to provide information pertaining to the pilots preceding 72-hour history prior to flight. The following questions were asked, and the answers are noted below.

1. What time did Mr. Svenson wake up the morning of the accident day (October 8, 2023)?

   I do not know exact time

2. What time did Mr. Svenson go to bed the day before the accident?

   Around 9pm

3. What was his day like on October 8th leading up to the flight (activities, naps, meetings, communication with JBI, etc.?).

   We played golf with friends

4. Did Mr. Svenson share any details about the accident flight, regarding any concerns about the weather or night conditions, or concerns with the helicopter?

   No

5. Did Mr. Svenson plan to depart at night, or was there a delay or change to the flight plan?

   He planned to leave after golf

6. Was Mr. Svenson taking any medications? Did he have any recent or ongoing health concerns?

   He took metropolol and Rosuvastatin. No he had no ongoing health concerns

7. Do you have Mr. Svenson's pilot logbooks? We are requesting copies of his last 12 months of pilot records if they have been located. I can provide a paid UPS label to take those photos myself (and then return the logs promptly to you), or you can provide copies.

   No I do not have his logbooks

8. Is there anything else that you feel the investigation should be aware of?

No

2.5 FAA Guidance, Spatial Disorientation

The FAA Civil Aerospace Institute's publication, "Introduction to Aviation Physiology," defines spatial disorientation as a loss of proper bearings or a state of mental confusion as to position, location, or movement relative to the position of the earth. Factors contributing to spatial disorientation include changes in acceleration, flight in instrument meteorological conditions (IMC), frequent transfer between visual meteorological conditions (VMC) and IMC, and unperceived changes in aircraft attitude.

The FAA's Airplane Flying Handbook (FAA-H-8083-3A) describes some hazards associated with flying when the ground or horizon are obscured. The handbook states, in part: The vestibular sense (motion sensing by the inner ear) in particular tends to confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in the attitude of the airplane, nor can they accurately sense attitude changes that occur at a uniform rate over a period of time. On the other hand, false sensations are often generated; leading the pilot to believe the attitude of the airplane has changed when in fact, it has not. These false sensations result in the pilot experiencing spatial disorientation.

G. LIST OF ATTACHMENTS

Attachment 1 – Operations Related Document Excerpts

Submitted by:

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