Aviation Investigation Final Report

Location:	Caldwell, Ohio	**Accident Number:**	ERA23LA309
Date & Time:	July 23, 2023, 14:20 Local	**Registration:**	N482TJ
Aircraft:	Bell 206-L4	**Aircraft Damage:**	Substantial
Defining Event:	Unknown or undetermined	**Injuries:**	1 Serious
Flight Conducted Under:	Part 133: Rotorcraft ext. load		

Analysis

The pilot had successfully completed several external load drop operations on the morning of the accident. Afterward, the pilot returned to the off-airport landing zone where a trailer with a ground crew supporting the mission had been positioned. The helicopter was refueled and the pilot checked fluid levels, with no anomalies noted. The helicopter subsequently departed so that the pilot could conduct additional external drop operations during the afternoon. The first cargo drop of the afternoon was completed successfully. While over the second drop zone, the helicopter descended into and impacted an area of wooded terrain, resulting in substantial damage to the helicopter.

During the morning operations, the pilot had no issues maneuvering the helicopter with a load configuration similar to that of accident flight and completing multiple cargo load drops. The ground crew observed nothing unusual during those flights. The ground crew did not witness the events leading up to the helicopter's descent into forested terrain, and the pilot could not recall those details.

Postaccident examination of the helicopter found no anomalies that would have precluded normal operation. Additionally, the long line used for the external load operation was found partially wrapped around the main rotor mast and tangled in trees surrounding the wreckage. The cargo and emergency release hooks remained attached to the helicopter and the load, and the load was found near the wreckage. It could not be determined at what point during the accident sequence the long line became wrapped around the main rotor mast. Postaccident performance calculations indicated that the accident helicopter would have had sufficient capability to perform an out-of-ground-effect hover. Thus, the reason for the helicopter's uncontrolled vertical descent and impact with terrain could not be determined.

Probable Cause and Findings

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

The helicopter's uncontrolled vertical descent and impact with terrain for reasons that could not be determined.

Findings

Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Maneuvering-low-alt flying	Unknown or undetermined (Defining event)

On July 23, 2023, about 1420 eastern daylight time, a Bell 206-L4 helicopter, N482TJ, sustained substantial damage during an accident near Caldwell, Ohio. The commercial pilot sustained serious injuries. The helicopter was operated by Sky Aviation Corporation under the provisions of Title 14 *Code of Federal Regulations* Part 133.

The helicopter had been housed at Cambridge Municipal Airport, Cambridge, Ohio. A ground crewmember stated that he and the accident pilot arrived at the airport about 0710 on the day of the accident. The pilot conducted a preflight examination, and the ground crewmember took fuel samples from the helicopter fuel tank and the trailer-based fuel tank that would be used to refuel the helicopter that day. The ground crewmember reported that all the samples he took were "clean, clear, and bright."

The helicopter and trailer were positioned at an off-airport landing zone, referred to as LZ2, so that the pilot could conduct external load cargo drop operations from that location and the ground crew could assist the pilot from the trailer. The pilot reported that the external load operations, which were occurring on a "catch up" day resulting from helicopter maintenance-related delays, began between 0800 and 0900. According to the operator, the pilot completed eight cargo drops during the morning operations and refueled the helicopter (via "hot fueling") as needed from the trailer-based fuel tank. The ground crew observed nothing unusual during those flights.

About 1215, the pilot returned to LZ2 and shut down the helicopter. Afterward, a ground crewmember refueled the helicopter with 335 pounds of fuel and spoke with the pilot about how the helicopter had been operating; the crewmember reported that, according to the pilot, "there were no issues" with the helicopter. Also, the pilot reported that, while the helicopter was shut down, he checked all fluid levels, and "everything seemed normal." The pilot noted that, even though the helicopter had a known oil leak, the oil level at the time was not low.

The helicopter departed from LZ2 about 1330. According to a cargo loading document that the operator provided, the purpose of the afternoon flights was to make eight additional external load drops. The eight bags to be dropped were attached to the eight release hooks on the helicopter's external load carrier. The eight bags weighed a total of 1,070 pounds. The cargo was released via a button on the cyclic control stick. When actuated, the cargo hook opened and released the respective bag. The helicopter was also equipped with an emergency cargo

release that, when pressed, would release the long line and the external load carrier; it was found in the closed position. The maximum cargo hook capacity was 2,000 pounds.

Flight track data indicated that the pilot maneuvered the helicopter southeast of LZ2 for about 45 minutes. The pilot completed one cargo load drop involving a bag that weighed 130 pounds, resulting in a helicopter external load weight of 940 pounds after the drop. The pilot then maneuvered toward the next drop zone. The flight track showed that the helicopter circled over the area of the accident site before descending through trees in a near-vertical (straight-down) path and impacting terrain. Figure 1 shows the helicopter's path over the drop zones and the locations of LZ2 and the accident site.

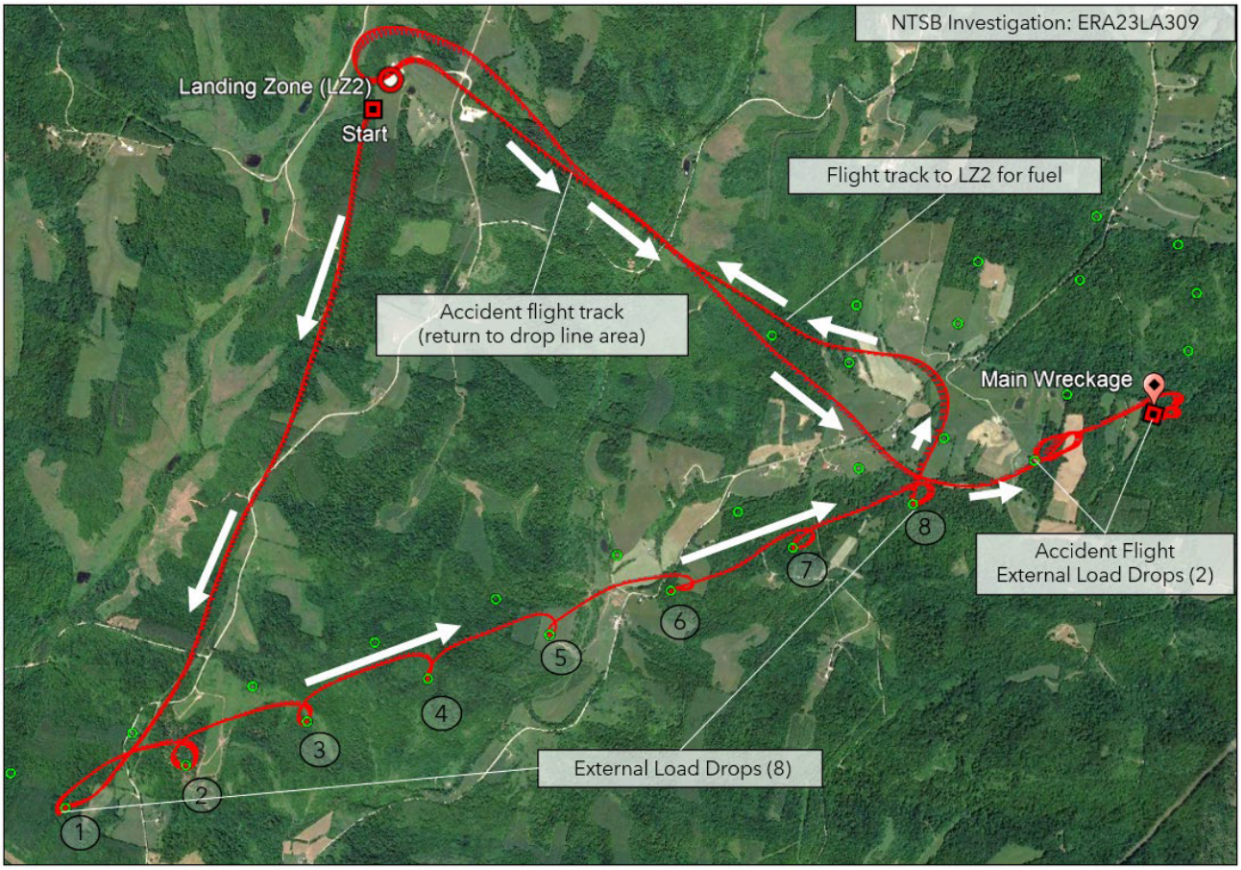

Figure 1. Flight track (red line), drop zones (green dots), and location of main wreckage at accident site. Note: The drop zones from the morning flights are number 1 through 8. The drop zones for the afternoon flights are labeled on the right side of the figure.

The pilot did not remember whether he dropped the second bag (which also weighed 130 pounds). The pilot also did not remember the helicopter's descent and impact with terrain, and he did not recall any unusual helicopter sounds or annunciations during the flight or issues related to the weather. The ground crew did not witness the accident.

The cockpit was substantially damaged by impact forces. The tailboom separated just aft of the intercoastal support and was located a few feet away from the fuselage. Both horizontal stabilizers remained attached to the tailboom.

The cyclic and collective on the pilot (right) side had fractured at the base, but each showed corresponding movement to the right and center servo actuators, respectively. Control tube continuity was observed to all three servo actuators. The left side anti-torque pedals were recovered, and directional control continuity was observed from the tailboom to the cockpit. Continuity was also established from the control tube in the tailboom to the tail rotor blades. No preimpact anomalies were observed with the main rotor drive and tail rotor drive systems.

The long line used for external load operations was found partially wrapped around the main rotor mast, as shown in figure 2, and partially tangled in trees surrounding the main wreckage. The cargo hook (attached to the underside of the fuselage) was found closed with the long-line hook attached. The emergency hook release was also found closed. The cargo hook was tested, and when actuated the hook opened and the long line separated from the helicopter. The long line was measured and found to be 122 ft in length. The line exhibited tearing and abrasions about 14 ft below the point where it was connected with the cargo hook, consistent with where it had been wrapped around the main rotor mast. The eight cargo hooks on the external load carrier were found closed, and the cargo load to be dropped at the second drop zone was located about 20 to 30 ft from the main wreckage.

Figure 2. Long line wrapped around the helicopter main rotor driveshaft at the accident site. (Source: FAA)

The engine was found in its installed position. The engine was mostly undamaged, with only the left front mount leg bent, the left rear mount leg broken, and the left discharge tube dented.

All engine external lines were secure. A pneumatic leak check detected no leaks. The engine N1 (gas producer) system turned freely and was continuous from the impeller to the starter generator and first-stage turbine wheel. The engine N2 (power turbine) system rotated and was connected to the powertrain. The compressor was removed and disassembled. Rub marks were observed between the impeller and impeller shroud, which was consistent with engine operation during the accident sequence. The engine oil filter was clean, and the oil was normal in appearance and smell.

Both main rotor blades exhibited significant fragmentation. The main rotor hub remained attached to the rotor mast and the root ends of the main rotor blades remained attached to the hub with fractures immediately outboard of the main rotor grip plates. Both blades also exhibited multiple indications of leading-edge impact-related damage, and the trailing edge on both blades was split open along the entire length of the blades. The inboard and outboard trim tabs for both main rotor blades were located at the accident site, but portions of each blade tip were not located.

Both tail rotor blades remained in their installed position and exhibited no significant deformation or fragmentation. The oil in the tail rotor gearbox was normal in appearance and smell. Overall, no mechanical anomalies of the helicopter were found that would have precluded normal operation.

The NTSB conducted an aircraft performance study to reconstruct the helicopter's flight path and ground track, and determine, if possible, the events/factors that initiated the helicopter's vertical descent and terrain impact. The estimated helicopter weight at the time of the accident was about 4,126 lbs. The performance data published in the helicopter's Rotorcraft Flight Manual indicated that the accident helicopter had adequate hover out-of-ground-effect performance available for the load configuration and environmental conditions, assuming a skid height of 40 feet and gross weight of 4,550 lbs or less.

Pilot Information

Certificate:	Commercial	**Age:**	44,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	May 5, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 3, 2022
Flight Time:	(Estimated) 5842 hours (Total, all aircraft), 125 hours (Total, this make and model), 5842 hours (Pilot In Command, all aircraft), 92 hours (Last 90 days, all aircraft), 62 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N482TJ
Model/Series:	206-L4 NO SERIES	**Aircraft Category:**	Helicopter
Year of Manufacture:	1996	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	52174
Landing Gear Type:	None; Skid	**Seats:**	7
Date/Type of Last Inspection:	July 10, 2023 100 hour	**Certified Max Gross Wt.:**	4450 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo shaft
Airframe Total Time:	7206 Hrs at time of accident	**Engine Manufacturer:**	Allison (Rolls-Royce)
ELT:	C126 installed, activated, aided in locating accident	**Engine Model/Series:**	250-C30
Registered Owner:	SKY AVIATION CORP	**Rated Power:**	540 Horsepower
Operator:	SKY AVIATION CORP	**Operating Certificate(s) Held:**	Rotorcraft external load (133), Commuter air carrier (135), On-demand air taxi (135), Agricultural aircraft (137)
Operator Does Business As:	SKY AVIATION CORP	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ZZV,902 ft msl	**Distance from Accident Site:**	21 Nautical Miles
Observation Time:	14:53 Local	**Direction from Accident Site:**	312°
Lowest Cloud Condition:	Few / 11000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	/ None	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.99 inches Hg	**Temperature/Dew Point:**	29°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Caldwell, OH (NONE)	**Type of Flight Plan Filed:**	None
Destination:	Caldwell, OH (NONE)	**Type of Clearance:**	None
Departure Time:	13:26 Local	**Type of Airspace:**	Class G

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	39.713893,-81.560599

Administrative Information

Investigator In Charge (IIC):	Hicks, Ralph
Additional Participating Persons:	Eric Fetterhof; FAA/FSDO; Columbus, OH Helen Tsai; Transportation Safety Board of Canada ; Gatineau, Quebec, OF Jon-Adam Michael; Rolls-Royce Corporation; Indianapolis, IN Chris Gatley; Van Horn Aviation; Tempe, AZ Gary Howe; Bell; Fort Worth, TX
Original Publish Date:	June 24, 2025
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=192704