



# Aviation Investigation Final Report

<b>Location:</b>	Wingate, North Carolina	<b>Accident Number:</b>	ERA21FA200
<b>Date &amp; Time:</b>	May 2, 2021, 13:18 Local	<b>Registration:</b>	N4528T
<b>Aircraft:</b>	ROBINSON HELICOPTER R44	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Low altitude operation/event	<b>Injuries:</b>	1 Fatal
<b>Flight Conducted Under:</b>	Part 137: Agricultural		

## Analysis

The pilot of the helicopter was conducting an aerial application when the accident occurred. Data recovered from an onboard GPS device showed that the helicopter took off, flew to the field, made two full passes and had turned back to begin a third. During the first two passes, the track showed a climb and descent near a power line that spanned the field; however, on the third and final pass, the climb and descent occurred immediately after the final turn and before the power line. The track also showed that, before the data ended, the helicopter was descending toward the power lines in the vicinity of where the wreckage ultimately came to rest.

Postaccident examination of the wreckage revealed that the tip portion of one of the fractured tail rotor blades exhibited impact scars consistent with a wire strike as well as impact with the tail rotor guard. One tail rotor blade tip was not found. Examination of the wreckage revealed no evidence of preimpact failures or damage that would have precluded normal operation of the helicopter. It is likely that the helicopter's tail rotor struck the power line, separating a portion of the tail rotor blades. The tail rotor imbalance resulted in the separation of the tail rotor gearbox and empennage, and a nose-down tendency from the forward center of gravity shift, consistent with the cockpit crushing at ground impact. Given the lack of powered impact signatures on the main rotor blades, it is possible that the pilot reduced the throttle and collective control, resulting in reduced main rotor power, when he experienced a reduced or complete loss of directional control authority after the tail rotor struck the power line.

The sun's elevation at the time of the accident was high enough that it would likely not have been a factor in the pilot's ability to detect the power line in the field. Given the available information, the pilot likely prematurely descended the helicopter while overflying the power line, which resulted in the subsequent wire strike.

## 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 clearance from a power line during a low-level aerial application flight, resulting in tail rotor impact with the power line, a loss of control, and subsequent impact with the ground.

### Findings

<b>Personnel issues</b>	Monitoring environment - Pilot
<b>Environmental issues</b>	Wire - Response/compensation

## Factual Information

### History of Flight

<b>Maneuvering-low-alt flying</b>	Low altitude operation/event (Defining event)
<b>Maneuvering-low-alt flying</b>	Collision with terr/obj (non-CFIT)

On May 2, 2021, at 1318 eastern daylight time, a Robinson R-44 helicopter, N4528T, was substantially damaged when it was involved in an accident near Wingate, North Carolina. The pilot was fatally injured. The helicopter was operated as a *Title 14 Code of Federal Regulations Part 137* aerial application flight.

The commercial pilot was spraying fungicide on a wheat field when the accident occurred. According to several witnesses, this was the first time they had observed the northwest portion of the field, which contained multiple power lines, being sprayed via aerial application. The helicopter had been applying fungicide all morning, operating about 15 ft above the 3-ft-tall wheat during the spraying operation. The pilot's wife reported that, after landing, having lunch and loading more fungicide, the pilot departed to begin spraying where he left off. Images of the flight track recovered from an onboard GPS device showed that the helicopter completed its first pass on a northerly heading. The helicopter then turned and flew over the field on a southerly heading, and the track ended in the vicinity of where the main wreckage came to rest.

Witnesses in a nearby home reported that they heard a loud noise and simultaneously lost electricity to their home. They looked out their window and saw the helicopter as it descended in a nose-down attitude before it impacted the field in the vicinity of the power lines. One of the witnesses stated that it appeared as though the helicopter became entangled in the wires before it descended nose-first into the ground.

The helicopter impacted and severed an energized wire, also known as a primary wire, that was oriented about 228° magnetic and measured about 29 ft above ground level at its lowest point over the wheat field. The wire spanned about 345 ft between two utility poles, 264 ft of that span over the wheat field. After the accident occurred, the severed wire was repaired the same day by the utility company. An additional power line spanned another portion of the northwesterly part of the field.

## Pilot Information

<b>Certificate:</b>	Commercial; Private	<b>Age:</b>	57, Male
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	4-point
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 With waivers/limitations	<b>Last FAA Medical Exam:</b>	March 3, 2021
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	(Estimated) 6670 hours (Total, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	ROBINSON HELICOPTER	<b>Registration:</b>	N4528T
<b>Model/Series:</b>	R44	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>	2008	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	1973
<b>Landing Gear Type:</b>	Skid	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	February 16, 2021 Annual	<b>Certified Max Gross Wt.:</b>	2500 lbs
<b>Time Since Last Inspection:</b>	76 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	3584 Hrs as of last inspection	<b>Engine Manufacturer:</b>	LYCOMING
<b>ELT:</b>	C126 installed, activated, did not aid in locating accident	<b>Engine Model/Series:</b>	O-540-F1B5
<b>Registered Owner:</b>	KRITTER CROPDUSTING INC	<b>Rated Power:</b>	260 Horsepower
<b>Operator:</b>	KRITTER CROPDUSTING INC	<b>Operating Certificate(s) Held:</b>	Agricultural aircraft (137)

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	EQY, 679 ft msl	Distance from Accident Site:	12 Nautical Miles
Observation Time:	12:53 Local	Direction from Accident Site:	312°
Lowest Cloud Condition:	Scattered / 3800 ft AGL	Visibility	10 miles
Lowest Ceiling:		Visibility (RVR):	
Wind Speed/Gusts:	8 knots / 15 knots	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	210°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.02 inches Hg	Temperature/Dew Point:	25°C / 15°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Wingate, NC	Type of Flight Plan Filed:	None
Destination:	Wingate, NC	Type of Clearance:	None
Departure Time:	13:15 Local	Type of Airspace:	Class G

Charlotte-Monroe Executive Airport (EQY) was located about 12 miles northwest of the accident site. At 1253, the reported weather included scattered clouds at 3,800 ft. A review of astronomical data from the National Oceanic and Atmospheric Administration revealed that, at the time of the accident, the sun was located at an azimuth of about 180° and an elevation of about 71° from the accident site.

## Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	34.882269,-80.435991

## Accident Site Examination

The helicopter came to rest on its left side. The cockpit and cabin portion of the fuselage was crushed and deformed aft. The tail boom remained attached to the main fuselage; however,

the empennage, composed of the upper and lower vertical stabilizers, horizontal stabilizer, the tail rotor and its gearbox, were separated from the tail boom. The windscreens and door windows were separated from the fuselage and fragmented. Both main rotor blades remained attached to the hub and were whole from root to the fractured tips. One main rotor blade was bent downwards about 2 ft outboard of the blade grip, and the other was bent downward and in a "U" shape. The agricultural hopper remained partially attached to the fuselage; it was breached, and its lower side was crushed from impact. The engine compartment and engine remained intact.

The empennage was located 99 ft and 336° from the main wreckage. (See Figure 1.) The lower vertical stabilizer sustained trailing edge, semi-circular impact deformation just below the horizontal stabilizer. The tail rotor gearbox was intact but separated from its airframe mount and was located about 112 ft and 208° from the main wreckage. The tail rotor hub remained attached to the tail rotor gearbox output shaft. A 5-inch inboard portion of one tail rotor blade remained attached to its hub; a 14.5-inch midspan section of this blade was found about 170 ft and 44° from the main wreckage. A 13.5-inch inboard portion of the second tail rotor blade remained attached to its hub. The tip end section from one of the fractured tail rotor blades, measuring about 5 inches in length, was located 119 ft and 3° from the main wreckage. The tip portion exhibited impact scars consistent with a wire strike as well as red paint transfer consistent with impact with the red-and-white colored tail rotor guard.

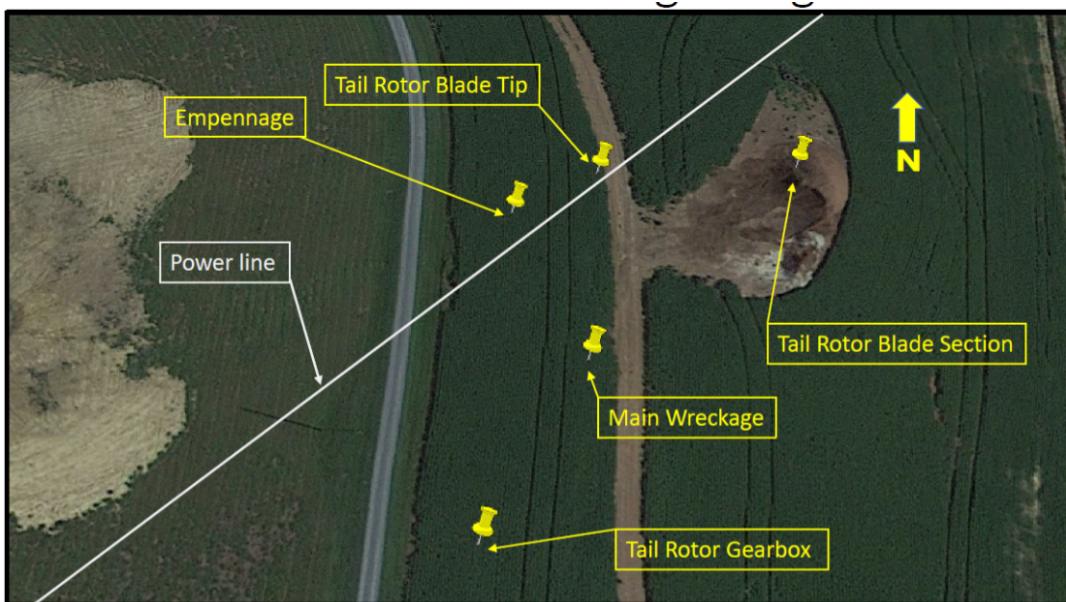


Figure 1 - Wreckage Diagram

### Airframe and Engine Examination

All major components of the helicopter were located in the vicinity of the accident site. Examination of the airframe and main rotor system revealed no evidence of preimpact failures. The main drive sheave (pulley) belts were intact and exhibited no evidence of anomalous damage or excessive wear. The clutch (freewheeling unit) functioned normally and continuity

of drive from the sheave to the main rotor and tail rotor drive shaft was confirmed. The tail rotor gearbox mounts were fractured and exhibited signatures consistent with overload. Impact deformation to the lower vertical fin was consistent with tail rotor blade contact. The leading edge of the tail rotor blade tip end fractures was deformed in the direction opposite of normal rotation.

The cyclic and collective controls were present in the main wreckage. The cyclic torque tube was fractured midspan. The left and right roll push-pull tubes remained connected to the aft end of the cyclic torque tube. The fore/aft bellcrank was partially separated and resting on the aft end of the cyclic torque tube. The vertical fore/aft push-pull tube remained connected to the bellcrank. The rod end that connected the fore/aft bell crank to the fork was fractured at the lower end threads with signatures consistent with overload. The base of the cyclic control was not visible due to crushing of the cockpit. The cyclic and collective controls remained connected at their base but could not be moved due to crushing of the cockpit.

The tail rotor control push-pull tubes were continuous from the aft cabin bulkhead to the empennage separation point. The tail rotor controls were not visible forward of the aft cabin bulkhead due to crushing of the cockpit. The right seat pedal set was present in the crushed cockpit. The push-pull tube fracture near the tail gearbox exhibited multiples scores on the tube consistent with contact with the rotating flex plate.

Examination of the engine revealed no anomalies that would have precluded its normal operation.

## **Additional Information**

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### **GPS Data Examination**

The helicopter was equipped with a GPS navigation device for aerial applications which consisted of a color moving map display of agricultural spray application data and a GPS receiver that fed data to this main display.

The non-volatile memory (NVM) was removed from the device and sent to the GPS manufacturer for processing. The processed data showed the accident flight, which lasted about 2 minutes and 41 seconds. (Figures 2 and 3.) The main wreckage location is shown with a red pin. According to the GPS manufacturer, the data recording could have ended up to 10 seconds before the accident occurred due to data buffering on the device. Review of the data

revealed that, during the first two passes, the track showed a climb and descent near the wire; however, on the final southerly pass, the climb and descent occurred immediately after the final turn to the south and before the wire. The track showed that the helicopter was descending toward the power lines where the main wreckage came to rest before the data ended.



Figure 2 - Flight track of the helicopter (yellow) with the final resting location of the wreckage annotated.

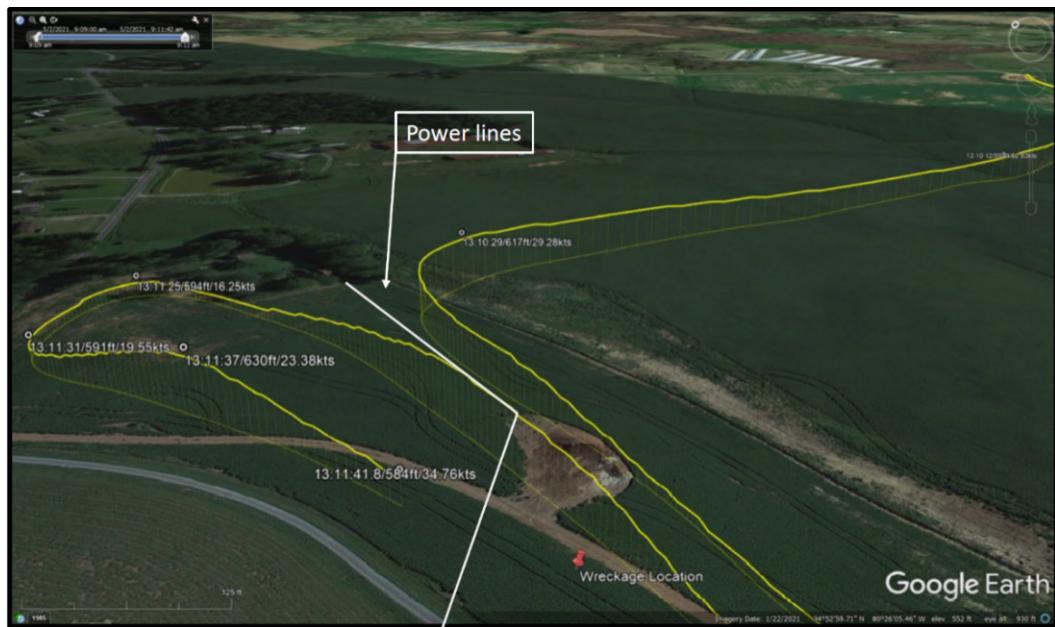


Figure 3 - Flight track of the helicopter (yellow) with the powerlines annotated (white).

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Spencer, Lynn
<b>Additional Participating Persons:</b>	Eric Newsome; FAA FSDO; Charlotte, NC Thom Webster; Robinson Helicopters; Torrance, CA James M Childers; Lycoming Engine; Williamsport, PA
<b>Original Publish Date:</b>	January 19, 2023
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class 3</a>
<b>Note:</b>	
<b>Investigation Docket:</b>	<a href="https://data.ntsb.gov/Docket?ProjectID=103009">https://data.ntsb.gov/Docket?ProjectID=103009</a>

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