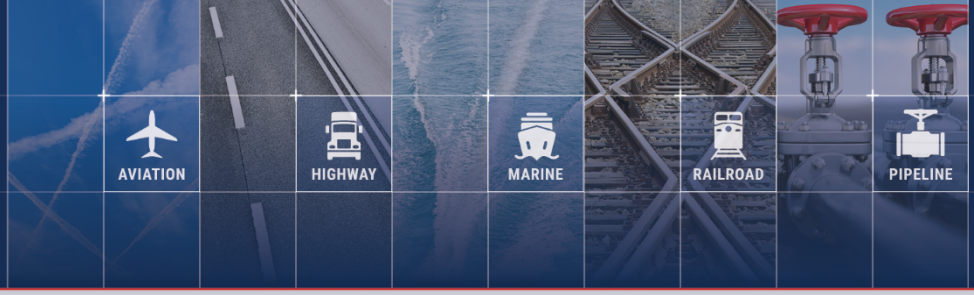

Aviation Investigation Final Report

Location:	Colorado City, Texas	**Accident Number:**	CEN21LA084
Date & Time:	December 10, 2020, 09:30 Local	**Registration:**	N7085Z
Aircraft:	Robinson R44	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Business		

Analysis

The pilot and passenger departed on a flight to herd cattle via helicopter. There were no witnesses to the accident. Examination of the wreckage and debris pattern was consistent with an inflight break-up at low altitude. Main rotor blade contact marks were found on the cabin section of the fuselage and likely occurred before ground impact. No preimpact anomalies were found with helicopter or engine.

Toxicology of the pilot identified high levels of delta-9-tetrahydrocannabinol (THC, the active compound in cannabis), as well as its active and inactive metabolites. Even accounting for postmortem redistribution, the levels of THC detected indicated recent use of cannabis and a very high likelihood of impairment. Given that gastric and liver levels were very high while lung levels were much lower, it is likely that the pilot used an edible form of the drug.

Based on the available information, it is likely that the pilot lost control and exceeded the performance and/or structural limitations of the helicopter while flying at low-level, resulting in an inflight breakup. It is likely that the pilot's impairment from his recent use of cannabis contributed to the accident.

Probable Cause and Findings

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

The pilot’s loss of control and exceedance of performance and/or structural limitations during low-altitude operations, which resulted in an inflight breakup.. Contributing to the accident was the pilot’s impairment from the effects of tetrahydrocannabinol.

Findings

Personnel issues	Illicit drug - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	(general) - Capability exceeded

Factual Information

History of Flight

Maneuvering-low-alt flying	Loss of control in flight (Defining event)
Maneuvering-low-alt flying	Low altitude operation/event

On December 10, 2020, about 0930 central standard time, a Robinson R44 helicopter, N7085Z, was destroyed when it was involved in an accident near Colorado City, Texas. The pilot and passenger sustained fatal injuries. The personal flight was conducted under the provisions of Title 14 *Code of Federal Regulation*s Part 91.

According to a family member, the intent of the flight was to herd cattle on a ranch. The flight originated from the pilot's home helicopter pad about 0900. There were no reported radio or distress calls from the pilot, and there were no witnesses. Visual flight rules conditions prevailed in the area around the time of the accident.

There were no witnesses to the accident, which was reported to local authorities about 1400.

Pilot Information

Certificate:	Commercial	**Age:**	31,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	June 24, 2020
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 2400 hours (Total, all aircraft), 1000 hours (Total, this make and model), 1 hours (Last 24 hours, all aircraft)		

The pilot's logbooks were not available for review. Estimates of his flight time were provided by a family member.

Aircraft and Owner/Operator Information

Aircraft Make:	Robinson	**Registration:**	N7085Z
Model/Series:	R44 Astro	**Aircraft Category:**	Helicopter
Year of Manufacture:	1995	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	0217
Landing Gear Type:	Skid	**Seats:**	4
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	2400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	O-540
Registered Owner:	On file	**Rated Power:**	280 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	Agricultural aircraft (137)

The helicopter's maintenance history could not be determined, as no logbooks were available for review.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KSNK,2430 ft msl	**Distance from Accident Site:**	23 Nautical Miles
Observation Time:	09:35 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	200°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.93 inches Hg	**Temperature/Dew Point:**	18°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Colorado City, TX	**Type of Flight Plan Filed:**	None
Destination:	Colorado City, TX	**Type of Clearance:**	None
Departure Time:	09:00 Local	**Type of Airspace:**	Class E

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	32.315621,-100.94719

The wreckage was located on relatively flat rural terrain, and the debris field was about 400 yards long. The first pieces of wreckage were identified as fragments of the left landing skid and forward skid strut. About 30 yards forward of the strut, fragments of a main rotor blade skin were found. The main wreckage, consisting of the cabin, main rotor assembly, and tail boom and rotor assembly were found about 400 yards from the left landing gear skid and strut fragments. There was no evidence of an in-flight collision with fixed obstacles.

The wreckage debris pattern was consistent with an inflight break-up at low altitude. A tail rotor driveshaft segment was found twisted and fractured forward of the aft flex coupling. The fracture and twist were consistent with a sudden stoppage. The tail rotor gearbox rotated by hand more than 360° with no anomalies. The tail rotor blades exhibited minor dents on the outer skins, with no damage to the leading edges. The tail rotor pitch control operated properly. The main rotor blades exhibited impact damage near mid-span and damage to the leading edge of the spars, which separated sections of skin and honeycomb.

The nose of the cabin showed impact damage consistent with main rotor blade contact before ground impact. Paint transfer marks on the damaged portions of the main rotor blades and the left side of the landing gear strut were consistent with the shape of a main rotor blade spar. There was paint transfer in the damaged areas of both main rotor blades. The main and tail rotor flight controls displayed several fractures. The surfaces of the fractures were angular and jagged, consistent with overload. The tail rotor pedals were found jammed with the left pedal forward.

Other than impact damages and separations, flight control continuity was established from the cockpit throughout all flight controls to the main rotor head and tail rotor assembly.

The main rotor blade fragments were examined and there was no evidence of pre-impact delamination. All main rotor blade damage was consistent with impact forces. The tail rotor blade damage was consistent with impact forces.

No pre-impact anomalies were found with the engine. Rotational continuity was established from the engine to the main and tail rotor gearboxes. Rotational signatures were present on the engine crankshaft.

No pre-impact structural anomalies were found.

Medical and Pathological Information

The pilot's certificate was revoked in 2011 for flying while intoxicated. It was reinstated in 2014.

According to the autopsy performed by the Southwestern Institute of Forensic Sciences at Dallas, the cause of death was blunt force injuries, and the manner of death was accident. No significant natural disease was identified.

Toxicology testing performed by the Laboratory at the Southwestern Institute of Forensic Sciences at Dallas identified delta-9-tetrahydrocannabinol (THC, the psychoactive compound in cannabis) at 132 ng/ml and its inactive metabolite, carboxy-delta-9-THC at 329.5 ng/ml in chest cavity blood.

Toxicology testing performed by the FAA's Forensic Sciences Laboratory identified delta-9-THC at 81.7 ng/ml in cavity blood as well as at 2,664.5 ng/ml in gastric contents, 29.5 ng/g in liver tissue, 914.4 ng/g in lung, and 94.8 ng/g in brain. In addition, its psychoactive metabolite, 11-hydroxy-delta-9-THC, was identified at 96 ng/ml in cavity blood,171.1 ng/g in liver tissue, 46.7 ng/g in lung, and 44.1 in brain. Finally, the inactive metabolite, carboxy-delta-9-THC was found at 356.6 ng/ml in cavity blood, 3749.5 ng/g in liver, 190.9 ng/g in lung, and 94 ng/g in the brain.

Administrative Information

Investigator In Charge (IIC):	Lemishko, Alexander
Additional Participating Persons:	Robert Smith; FAA FSDO Lubbock; Lubbock, TX Thom Webster; Robinson Helicopters; Torrence, CA
Original Publish Date:	February 8, 2023
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=102399