Aviation Investigation Final Report

Location:	Raeford, North Carolina	**Accident Number:**	ERA22LA348
Date & Time:	July 29, 2022, 14:04 Local	**Registration:**	N497CA
Aircraft:	CASA C212	**Aircraft Damage:**	Substantial
Defining Event:	Abnormal runway contact	**Injuries:**	1 Fatal, 1 None
Flight Conducted Under:	Part 91: General aviation - Skydiving		

Analysis

After dropping a load of skydivers, the pilots were returning to the airport to pick up another group of skydivers, with the second-in-command (SIC) as the pilot flying. The pilot-in-command (PIC) indicated that the approach was stabilized until the airplane descended below the tree line and encountered what he described as windshear. The SIC initiated a go-around; however, before he could arrest the airplane's sink rate and establish a climb, the right main landing gear impacted the runway surface and separated from the airplane. The crew declared an emergency, reported the loss of the right wheel, and requested to divert to a larger airport. During this diversion, the crew planned the landing, and the SIC communicated with air traffic control (ATC) while the PIC flew the airplane.

The PIC reported that, about 20 minutes into the diversion, after conducting approach and emergency briefings, the SIC became visibly upset following the hard landing. The PIC described that, about this time, the SIC opened his side cockpit window and lowered the ramp in the back of the airplane, indicating that he felt like he was going to be sick and needed air. The PIC stated that the SIC looked at him and said he was sorry, got up from his seat, removed his headset, and ran out of the airplane via the aft ramp door. The PIC subsequently notified the controller that the copilot had just jumped out of the back of the airplane without a parachute. The PIC subsequently performed a successful emergency landing.

Although the PIC and operator reported that the SIC's departure from the airplane was an intentional act, there was insufficient information to support that assertion. No family or company personnel shared concerns about the SIC's state of mind or behavior until the events that resulted in his departure from the aircraft; however, a company pilot shared an event during which the SIC had seemed to have a disproportionate, intense emotional and physical reaction upon becoming worried that he had lost a fuel payment card. The operator and family

also indicated that the SIC felt that the accident flight with the PIC, who was also the chief pilot for the operator, was very important. This would have added to the SIC's stress and emotional response after the hard landing, during which he was the pilot flying. In the 20 minutes of flight while serving as the monitoring pilot, the SIC was actively engaged in communicating with ATC, reviewing emergency procedures, and providing recommendations to the PIC on the landing runway at the diversion airport.

In his initial statement to authorities, the PIC stated that, before departing the airplane, the SIC became visibly upset and apologetic, and reported feeling sick. His actions to increase ventilation in the cabin, which included opening the window and lowering the ramp, as well as his hurried departure from his seat, are consistent with an attempt to address increasing nausea symptoms and a desire to not throw up in the cockpit. However, the SIC made an unsafe decision to run to the rear of the cabin with the ramp in a fully lowered position, as he likely had not previously been in the cabin in flight with the ramp down. It is possible in his haste he lost his footing when encountering the area of the ramp and inadvertently fell from the airplane. Weather sounding and radar data supported the potential for windshear and turbulence activity, and the PIC reported that there had been moderate turbulence during the flight.

The postaccident toxicological finding of mitragynine in the SIC's liver tissue and urine indicated that he had used a kratom product, which had the potential to cause impairment. Notably, anxiety control was a common motivation for kratom use, and anxiety itself may predispose people to heightened physiological responses to stress, which sometimes manifest with nausea, dizziness, or feeling hot or smothered. Although it is possible that effects of kratom may have contributed to nausea or to some dizziness or perceptual impairment that may have increased his risk of falling, there is insufficient evidence to determine whether effects of the SIC's kratom use contributed to the accident.

Probable Cause and Findings

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

The airplane's encounter with windshear during landing, which resulted in a hard landing and separation of the right main landing gear, and the pilot's subsequent decision to leave his seat in flight, which resulted in his fall from the airplane.

Findings

Environmental issues	Windshear - Ability to respond/compensate
Aircraft	(general) - Damaged/degraded
Personnel issues	Incorrect action selection - Copilot

Factual Information

History of Flight

Approach-VFR pattern final	Other weather encounter
Approach-VFR go-around	Abnormal runway contact (Defining event)
Enroute	Miscellaneous/other
Landing	Runway excursion

On July 29, 2022, about 1404 eastern daylight time, a CASA 212-200 airplane, N497CA, was substantially damaged during a hard landing near Raeford, North Carolina. The pilot-in-command (PIC) was not injured, and the second-in-command (SIC) sustained fatal injuries during the subsequent diversion to Raleigh-Durham International Airport (RDU), Durham, North Carolina. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 skydiving flight.

Federal Aviation Administration (FAA) radar data revealed that the accident flight departed at 1341 and climbed above 13,000 ft mean sea level (msl). According to the PIC, the SIC was flying the airplane and, after unloading the skydivers, he descended to pick up another group of skydivers. The PIC stated that the approach was stabilized until the airplane descended below the tree line and "dropped." Both pilots called for a go-around maneuver, which the SIC initiated; however, before the SIC could arrest the airplane's sink rate and initiate a climb, the right main landing gear (RMLG) impacted the runway surface.

The PIC took control of the airplane about 400 ft above ground level and flew a low approach over the runway so that airfield personnel could verify the damage. The personnel subsequently called the PIC to let him know that they recovered the fractured RMLG on the runway. The flight crew contacted air traffic control (ATC) at 1411 and declared an emergency, reported the loss of the right wheel, and requested to divert to RDU. While enroute to RDU, the crew reviewed emergency procedures and planned the landing. During this time, the SIC was primarily responsible for communicating with controllers and reviewing checklist procedures while the PIC flew the airplane. The PIC stated that the SIC was engaged and offered input on runway assignment based on his knowledge of RDU, which the PIC accepted.

Review of ATC information revealed that communications between the SIC and controllers were routine. In his final transmission at 1429, the SIC acknowledged a course heading. The PIC reported that, about this time, which was about 20 minutes into the diversion to RDU, the SIC became visibly upset and repeatedly apologized then said, "I think I am going to be sick." The PIC described that the SIC opened his side cockpit window, turned his head toward it, and

“may have gotten sick.” The PIC took over radio communications, and the SIC lowered the ramp in the back of the airplane, indicating that felt like he was going to be sick and needed air.

The PIC reported that he, “did not find this overly alarming as this (was) a common practice in a hot environment and given our situation.” Subsequently, the PIC stated that the SIC looked at him and stated, “I am sorry,” then disconnected his seat belt, dropped his headset, and ran out the back of the airplane toward the fully open ramp in a headfirst dive. In a radio transmission to ATC about 1 1/2 minutes after the SIC’s radio acknowledgement of the course heading, the PIC notified ATC that the copilot had just “jumped out the back of the plane without a parachute.”

The PIC proceeded on course to RDU, where he performed a low approach and then an emergency landing. Upon landing, the airplane departed the right side of the runway and came to rest in the grass. Examination of the accident site by an FAA inspector revealed substantial damage to the RMLG, landing gear fittings, and the airframe structure.

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	51,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	April 7, 2022
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	May 24, 2022
Flight Time:	2074 hours (Total, all aircraft), 1261 hours (Total, this make and model), 1033 hours (Pilot In Command, all aircraft), 169 hours (Last 90 days, all aircraft), 45 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	23,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	January 18, 2022
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 30, 2022
Flight Time:	1072 hours (Total, all aircraft), 197 hours (Total, this make and model), 826 hours (Pilot In Command, all aircraft), 185 hours (Last 90 days, all aircraft), 42 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Pilot-in-Command

In an interview with police, the PIC stated he and the SIC met for the first time during this assignment and flew together on the day of the accident as well as the day before. The PIC also served as the Chief Pilot for the operator and had interviewed the SIC when he applied for the pilot position.

Interviews with several company pilots indicated that the PIC was well-liked, knowledgeable, patient, and respected. One company pilot stated that the PIC would never “get into a situation where he corrects an SIC in a manner that makes the situation worse, especially not on an operation.” Another company pilot stated that the PIC was “very approachable. He’s a guy you never want to disappoint. He’s like your dad, and you’d feel bad if you disappointed him. He’s trying to get you to the best and you want to show him your best. He’s not banging on the dash.”

Second-in-Command

The SIC’s family was under the impression that the accident flight was a checkride; however, the operator stated that this was not correct. The SIC’s father stated that his son “could be tough on himself” and that he could see him “being physically sick because of (the loss of the landing gear on the flight with the Chief Pilot).” He also reported that his son had performed a gear-up landing in his previous position as a flight instructor. The operator referenced “internal reports” that indicated that the SIC placed significant professional importance upon a successful flight with the Chief Pilot (the PIC).

Interviews with colleagues and family of the SIC indicated that he was well-liked, happy, smart, and very pleased to be working for the operator. One of the pilots who flew with the SIC stated that:

(The SIC) strove to be near perfect in everything. If we were coming back and we were a few degrees off on the heading, he would chide himself. His approaches were absolutely perfect. I was impressed with his abilities. . . The one thing I noticed is that he wanted to be perfect all the time. He didn't allow himself any slack.

One time he was so flustered after he dropped the fuel card. He was so upset with himself. "I dropped the card, I can't believe I dropped the card." His face was red, and he was sweating. I told him to take 20 minutes to walk to the fuel farm and find it. He RAN to the farm and found it. He was hard on himself, really hard. He knew what the customers needed for a precise product, and he really strove for that and wanted to do a good job.

Aircraft and Owner/Operator Information

Aircraft Make:	CASA	**Registration:**	N497CA
Model/Series:	C212	**Aircraft Category:**	Airplane
Year of Manufacture:	1983	**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	291
Landing Gear Type:	Tricycle	**Seats:**	3
Date/Type of Last Inspection:	July 23, 2022 Continuous airworthiness	**Certified Max Gross Wt.:**	16976 lbs
Time Since Last Inspection:	36.2 Hrs	**Engines:**	2 Turbo prop
Airframe Total Time:	17008.3 Hrs at time of accident	**Engine Manufacturer:**	Garett AiResearch
ELT:	C126 installed, not activated	**Engine Model/Series:**	TPE331-10R-514C
Registered Owner:	SPORE LTD LLC	**Rated Power:**	900 Horsepower
Operator:	Rampart Aviation	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	3RAA

The CASA C-212 was a turboprop short take-off and landing (STOL) medium-sized cargo plane equipped with two aft doors: the upper cargo door and the ramp door. The cargo door opened upwards and inwards, and the ramp door opened downward and outward. Both were hydraulically-operated from the cockpit via the cargo door handle located directly behind the SIC's station. Per the Aircraft Flight Manual, the cargo and ramp door are closed for all

takeoffs and landings. To allow the skydivers to exit the airplane, the SIC would typically ensure that the ramp surface was level with the cabin floor. In this position, the level cabin floor and ramp surface measured 25 feet, 10 inches from the cockpit bulkhead to end of ramp door. A company pilot stated that, when fully lowered, the downward angle of the ramp door was “very steep” and slippery. The distance from the cockpit bulkhead to where the cabin floor would have dropped off steeply with the ramp fully lowered was about 21.5 feet, about 4 feet closer than the SIC would have been accustomed to seeing the jumpers exit the airplane. A company pilot stated that the SIC had likely never been in the back of the airplane with the ramp lowered.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	HFF,376 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	13:56 Local	**Direction from Accident Site:**	271°
Lowest Cloud Condition:	Scattered / 4200 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 6000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	33°C / 25°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Raeford, NC	**Type of Flight Plan Filed:**	VFR
Destination:	Raeford, NC	**Type of Clearance:**	VFR flight following
Departure Time:		**Type of Airspace:**	Class G

The PIC reported that there was moderate turbulence during the flight. Weather reports along the route of flight to RDU included moderate downdraft convective energy in the area. Additionally, the Severe Weather Gust Potential and Microburst Gust Potential were 50 knots and 57 knots, respectively, along the route of flight. Recorded data downloaded from the flight included vertical load factors supportive of turbulence enroute to RDU.

Airport Information

Airport:	Raeford West Airport NR20	**Runway Surface Type:**	Grass/turf
Airport Elevation:	280 ft msl	**Runway Surface Condition:**	Dry;Rough
Runway Used:	20	**IFR Approach:**	None
Runway Length/Width:	4250 ft / 50 ft	**VFR Approach/Landing:**	Go around;Traffic pattern

Wreckage and Impact Information

Crew Injuries:	1 Fatal, 1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal, 1 None	**Latitude, Longitude:**	35.030556,-79.236667(est)

Medical and Pathological Information

The North Carolina Office of the Chief Medical Examiner performed the autopsy of the SIC. According to the autopsy report, the cause of death was multiple blunt force injuries, and the manner of death was accident.

Toxicological testing of the SIC's urine performed by the North Carolina Office of the Chief Medical Examiner was negative for tested-for substances. Toxicological testing by the FAA Forensic Sciences Laboratory detected ethanol at 0.396 g/dL in the SIC's liver tissue and at 0.011 g/dL in his urine and did not detect ethanol in his brain tissue. Acetone was detected at a low level in his brain tissue and was not detected in his liver tissue or urine. Mitragynine was detected in his liver tissue and urine.

Ethanol can be produced by microbes in a person's body after death. Postmortem ethanol production is made more likely by extensive traumatic injury.

Acetone is an organic compound that is used industrially and occurs naturally, including as a byproduct of fat metabolism by living cells. Acetone at the low level detected in the SIC's brain tissue does not have specific significance and would not be expected to have impairing effects.

Mitragynine is a predominant active substance in the drug kratom. Kratom comes from the leaves of a tropical tree species native to Southeast Asia. In the United States, kratom products are widely available for online and retail purchase. Users typically consume kratom by chewing the leaves, brewing the leaves into a tea, or consuming extracts, powder, or pills derived from the leaves. Americans who self-medicate with kratom commonly do so with the intention of relieving pain, anxiety, depression, or opioid withdrawal symptoms. Various other medicinal effects might be sought by users, including treating cough, diabetes, diarrhea, insomnia, or alcohol withdrawal. The United States Food and Drug Administration has not approved kratom for any use, and warns consumers not to use the drug, citing safety concerns that need further research, including risk of abuse and addiction. The United States Drug Enforcement Administration has identified kratom as a “Drug of Concern,” but has not listed it as a federally-controlled substance.

Kratom use is considered disqualifying for pilots under internal FAA policy. Notably, some of the symptoms of kratom use and/or withdrawal may overlap with symptoms of conditions that kratom users may seek to treat. For example, anxiety control is a common motivation for kratom use, and anxiety itself may predispose people to heightened physiological responses to stress, which sometimes manifest with nausea, dizziness, or feeling hot or smothered.

Additional Information

On-Board Recorder Information and Ballistics Study

According to ballistic calculations, the SIC left the airplane between 14:31:53 and 14:32:01. A portable wireless receiver on the accident airplane that contained global positioning system (GPS) location data and attitude and heading reference system (AHRS) data was recovered and examined. During the 8-second time frame that the SIC left the airplane, a roll transient and spike in vertical load factor occurred that was an outlier compared to the earlier seven minutes and following three minutes of flight. This event could have been before, during, or after the SIC departed the airplane, and it could not be determined if this roll transient was commanded or a result of external forces on the airplane.

Administrative Information

Investigator In Charge (IIC):	Spencer, Lynn
Additional Participating Persons:	Mike Allen; FAA/FSDO; Greensboro, NC Juan Jose Balonga; Comisión de Investigación de Accidentes e Incidentes de Aviación Civil; Madrid
Original Publish Date:	December 14, 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=105636