Aviation Investigation Final Report

Location:	Randsburg, California	**Accident Number:**	WPR22FA033
Date & Time:	November 12, 2021, 14:13 Local	**Registration:**	N984LD
Aircraft:	Zenith STOL CH701	**Aircraft Damage:**	Destroyed
Defining Event:	Aerodynamic stall/spin	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and pilot-rated passenger planned to fly the experimental, amateur-built short take-off and landing (STOL) airplane to a series of desert airports and backcountry airstrips. The accident airstrip was the first stop on their itinerary. They had flown together at least once before in the accident airplane, but this was the first time the pilot, who was the owner of the airplane, had landed at a remote, backcountry airstrip.

The accident airstrip was located within a bowl-like feature in the foothills of a mountain range. Published information about the airstrip recommended a traffic pattern altitude of about 825 ft above ground level (agl); however, flight track data indicated that the airplane's altitude on the downwind leg was about 50 ft above the ridge that ran roughly parallel to the airstrip, and about 125 ft above the runway surface, with very little lateral separation from the runway. Witnesses observed the airplane fly low over the ridgeline while on the downwind leg, during which it appeared to encounter turbulence. The airplane then began a left turn onto the base leg of the traffic pattern and overshot the runway centerline toward rising terrain as it continued in a left turn onto final approach.

The airplane's bank angle increased to between 60° and 90° as it turned from base to final, and the airplane then rapidly descended, consistent with an aerodynamic stall. The airplane impacted the ground about 700 ft short of the runway threshold and about 300 ft right of the runway centerline.

Examination of the airframe and engine did not reveal any anomalies that would have precluded normal operation, and damage to the propeller blades indicated that the engine was producing power at impact.

Witness accounts regarding the direction and velocity of the wind at the time of the accident varied; however, information from a GPS unit onboard the airplane recorded an increased groundspeed on the base leg of the traffic pattern, suggesting crosswind conditions that would have resulted in a tailwind while on the base leg. This likely contributed to the pilot overshooting the runway extended centerline, which placed the airplane closer to rising terrain on the other side of the runway. The runway overshoot, combined with the proximity to rising terrain, likely resulted in the pilot's steep turn in the direction of the runway as reported by witnesses before the airplane's descent into terrain. It is likely that, during that turn, the pilot exceeded the airplane's critical angle of attack, resulting in an accelerated aerodynamic stall.

Although the airport windsock was inoperative at the time of the accident, there were flags present at a campsite within the airport valley that would have indicated the direction of the wind. Additionally, the pilot was likely aware of the wind during the downwind leg because the airplane maintained a relatively straight track, which would have required control inputs to compensate for the crosswind conditions. Even without the crosswind, the airplane's reduced lateral separation from the runway during the downwind leg would have required an aggressive turn onto final to avoid overshooting the runway.

The investigation could not rule out the possibility that the pilot-rated passenger was flying the airplane at the time of the accident; however, the airplane's owner was seated in the left seat, which was the only seat equipped with wheel brake controls. Given that the accident occurred during the approach to land, it is likely the owner was flying the airplane. The terrain surrounding the accident airstrip would have provided an unusual sight picture during the landing approach, likely compounded by the pilot's decision to fly the traffic pattern at a very low altitude. It is likely that the pilot's limited experience flying into remote, backcountry airstrips such as the accident airstrip contributed to his failure to establish a stabilized approach to the runway in the presence of unfamiliar topography.

The airplane was originally equipped with leading edge slats to enhance short field takeoff and landing performance, but they had been removed. The airplane could be flown without them, and a safe landing at this airstrip could still have been accomplished if a stabilized approach was performed.

Although autopsy of the pilot revealed cardiovascular disease, operational evidence indicates that it is unlikely that he experienced a sudden medical event.

Probable Cause and Findings

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

The pilot’s improper landing approach, which failed to account for wind conditions, and his exceedance of the airplane’s critical angle of attack following an overshoot of the runway extended centerline, resulting in an accelerated aerodynamic stall. Contributing to the accident was the pilot’s lack of experience flying into challenging backcountry airstrips.

Findings

Aircraft	Descent/approach/glide path - Not attained/maintained
Aircraft	Crosswind correction - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Personnel issues	Total experience - Pilot
Aircraft	Angle of attack - Capability exceeded

Factual Information

History of Flight

Approach-VFR pattern base	Aerodynamic stall/spin (Defining event)
Approach-VFR pattern base	Collision with terr/obj (non-CFIT)

On November 12, 2021, about 1413 Pacific standard time, an experimental, amateur-built Zenith STOL CH-701, N984LD, was destroyed when it was involved in accident near Randsburg, California. The pilot and pilot-rated passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The accident occurred at Goler Heights Airstrip, which was located within a 1,500-ft-wide valley at an elevation about 2,450 ft mean sea level (msl). The runway was oriented on a southwesterly heading, with rising terrain to the north, a box canyon in line with the landing approach to the east, and a parallel ridgeline to the south, which fell away to an open desert expanse.

A witness, who was located on a camping spot about ½ mile to the west and overlooking the runway, stated that he had camped at that location many times before, and was familiar with aircraft landing on the airstrip. About 1410, he heard the typical sound of an airplane in the traffic pattern and saw a high-wing airplane flying northeast along the ridgeline about 300 ft over the runway. He stated that it was flying in a manner that seemed appropriate for an airplane approaching the southwest runway for landing.

A short time later, he heard the sound of increasing engine speed, and when he looked up, the airplane was at the north end of the runway, flying northeast. The airplane was wobbling, and it then began to bank left. Its bank angle reached about 60° such that he could see the full wing profile; the nose then dropped, and the airplane descended rapidly to the ground.

Another witness, who was located within the runway valley, stated that his attention was drawn to an airplane flying northeast over the ridgeline. It was flying about 50 ft above the ridge and appeared to be bouncing in a manner that he attributed to the airplane encountering turbulence. He was concerned and continued to watch the airplane as it began a left turn consistent with an approach to land on the southwest runway. The airplane's bank angle then rapidly increased, reaching what he estimated to be about 90°. The nose of the airplane then suddenly dropped, and the airplane rapidly descended and collided with the ground, erupting in flames.

Both witnesses reported that they did not see the airplane emitting smoke or vapors at any time prior to the impact.

Data from an onboard Appareo Stratus 3 unit showed that the airplane initially departed from Kern Valley Airport (L05), Kernville, California, at 1134 on the day of the accident, and flew 15 miles north along the Kern River Valley. It then turned around and flew a 65-mile meandering track to the south, before heading northeast and landing at Inyokern Airport (IYK), Inyokern, California, at 1311 (see figure 1). Fuel receipts indicated that at 1331, the pilot purchased 7 gallons of 100 low-lead aviation gasoline.

Figure 1 – Flight track. Morning of accident (red), accident flight track (yellow).

The airplane departed from IYK on the accident flight at 1349 and climbed to an altitude of about 3,100 ft msl (650 ft above ground level [agl]). The airplane then began a left turn to the southwest in the general direction of Goler Heights, and for the next 18 minutes, gradually climbed to about 5,000 ft msl while maintaining a groundspeed between 55 and 65 kts.

At 1409, the airplane had passed over the Red Rock Canyon State Park Mountain Range and was about 3 miles northwest of, and 2,500 ft above the airstrip. Over the next 2 ½ minutes, the airplane began a descending left turn until it reached the parallel ridgeline of the left downwind leg. The airplane maintained a groundspeed of about 60 knots during the decent, with descent rates varying between about 500 and 1,450 ft per minute (see figure 2).

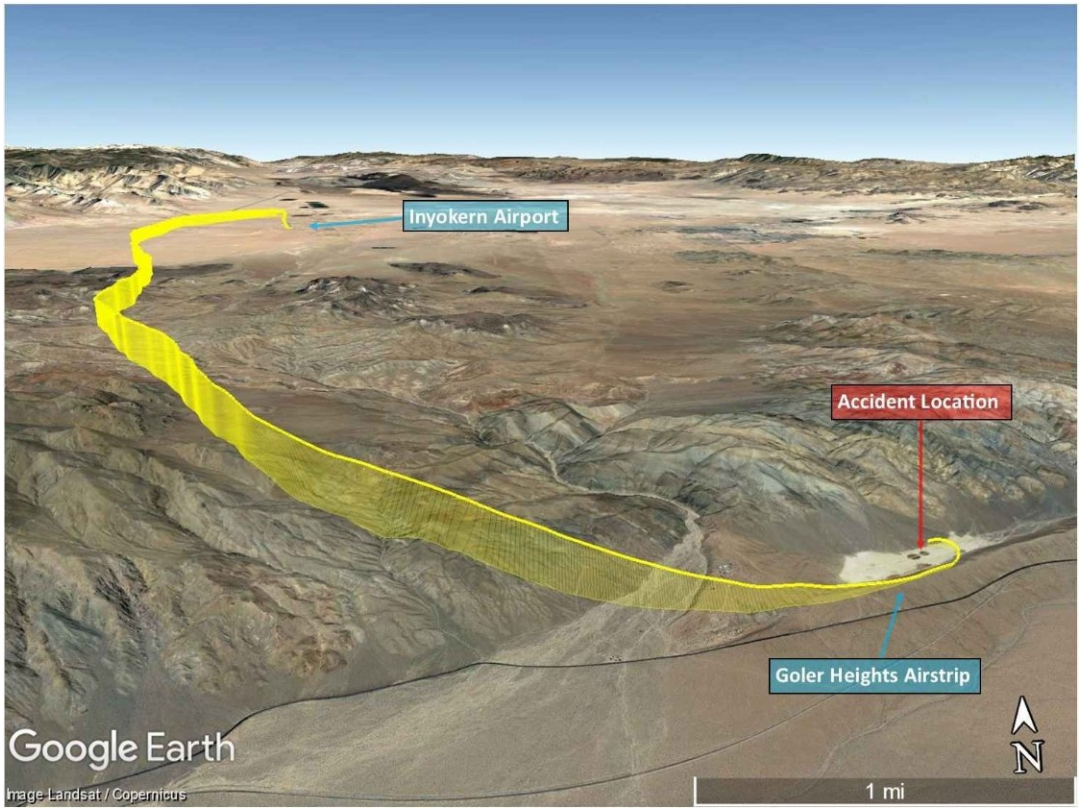

Figure 2 – Accident flight track

By the time the airplane had reached the downwind leg, it was about 800 ft laterally from the runway and had slowed to a groundspeed of 47 kts. The airplane continued on the downwind leg along the ridgeline about 50 ft agl (125 ft above the runway), as the speed decreased to 40 kts. Shortly after the airplane passed the landing threshold, it began a 25° left turn consistent with the first stage of a base turn. As the runway centerline approached, the airplane's turn began to tighten, and its groundspeed began to increase to 65 kts, as it overshot the runway centerline and continued toward rising terrain. The airplane's last position was recorded five seconds later, by which time the airplane had reached the runway heading, but had overshot the centerline by 300 ft. The wreckage was located about 150 ft beyond, and 100 ft below the last recorded position (see figures 3 and 4).

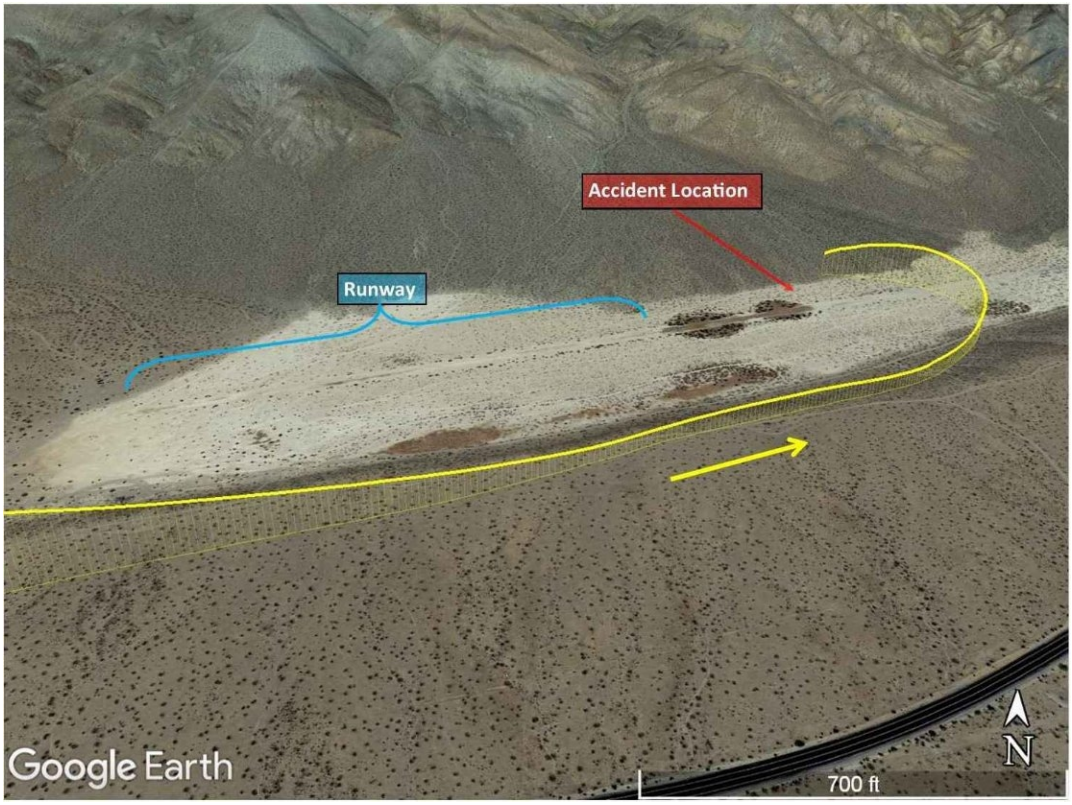

Figure 3 –Descent path into traffic pattern.

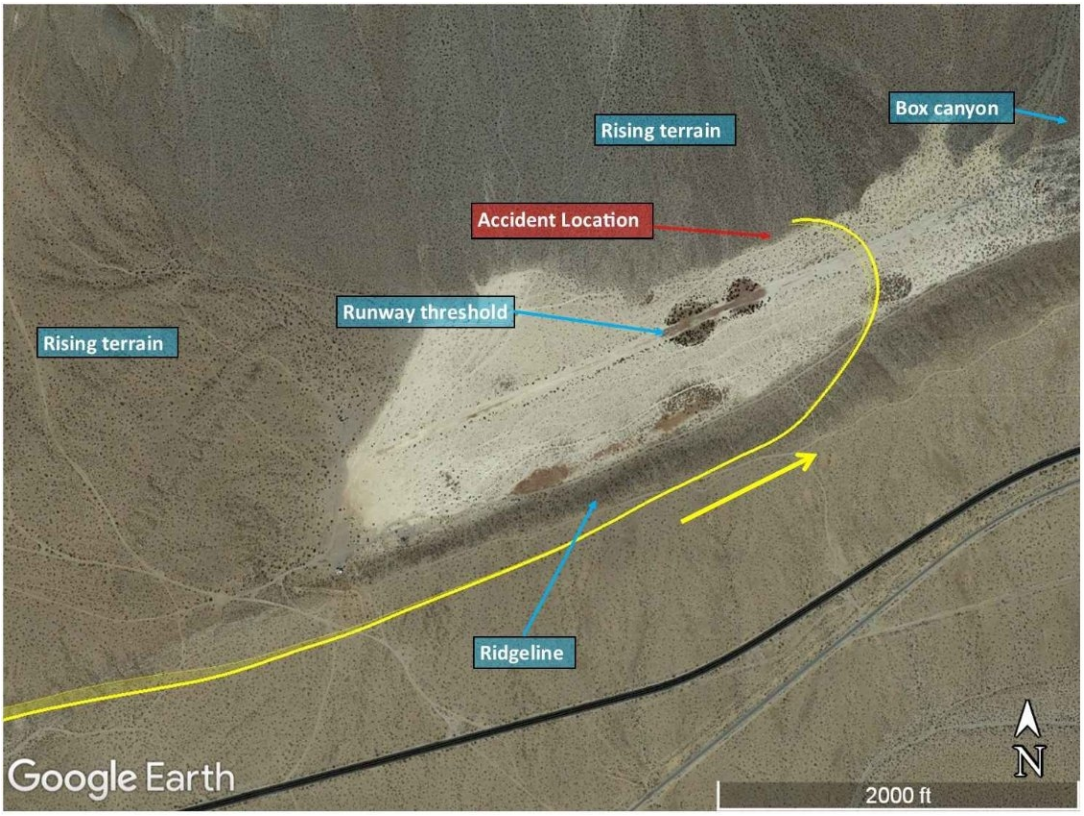

Figure 4 –Plan view of flight track.

Pilot Information

Certificate:	Commercial; Remote; Sport Pilot	**Age:**	68,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Glider	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Sport pilot None	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	June 28, 2021
Flight Time:	(Estimated) 700 hours (Total, all aircraft), 120 hours (Total, this make and model), 2 hours (Last 24 hours, all aircraft)		

Pilot-rated passenger Information

Certificate:	Commercial; Flight instructor; Military; Remote	**Age:**	31,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Glider; Helicopter	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	
Instructor Rating(s):	Glider	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	December 15, 2019
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	December 22, 2019
Flight Time:	(Estimated) 1310.7 hours (Total, all aircraft), 0 hours (Total, this make and model), 631.5 hours (Pilot In Command, all aircraft)		

Pilot

The pilot held a commercial pilot certificate with a glider rating and a sport pilot endorsement for airplane single-engine land. He had not applied for FAA medical certification, nor was he required to based on his glider and sport pilot license.

The pilot's flight logbooks were damaged during the post-accident fire, and his flight experience could not be determined. The logbook remnants indicated 549 total flights, the majority of which were in gliders, with 112 total flights in the accident airplane since October

15, 2020. A friend of the pilot stated that he typically flew the airplane two to three times per week, and he had accumulated between 100 and 200 hours of flight experience in it.

There was no documentation in the pilot's logbook indicating he had landed at the accident airstrip before the day of the accident. His flight instructor stated that they had not flown to the airstrip together, and he believed the pilot had limited experience flying into remote airstrips. He stated that the pilot was planning to use the airplane to fly into wilderness spots to go camping and fishing.

The pilot was flying the airplane from the left seat, which was the only position that included wheel brake controls.

Pilot-Rated Passenger

The pilot was a US Navy-trained aviator. In addition to his Navy experience as a helicopter pilot, he held a commercial pilot certificate with airplane, glider, and rotorcraft-helicopter ratings, as well as a flight instructor certificate with a glider rating. He regularly flew the tow airplane for a glider club, and it was through this club that he met the accident pilot.

The passenger's logbooks were current through May 2020. It could not be determined how often the pilot and passenger flew together; however, a social media post provided by family members indicated that they had flown together before in the accident airplane.

Aircraft and Owner/Operator Information

Aircraft Make:	Zenith	**Registration:**	N984LD
Model/Series:	STOL CH701	**Aircraft Category:**	Airplane
Year of Manufacture:	2015	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	7-8819
Landing Gear Type:	Tricycle	**Seats:**	2
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	1100 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	ULPOWER
ELT:	Installed	**Engine Model/Series:**	UL260i
Registered Owner:	On file	**Rated Power:**	97 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

According to the kit manufacturer, the airplane was developed as an "off-airport" STOL airplane designed with the capabilities of an ultralight aircraft. The design also met the definition of a light sport aircraft (LSA) for operation under the FAA's Sport Pilot/LSA category.

The airplane was issued its airworthiness certificate in 2015, and, according to the airplane's previous owner, the pilot purchased it from him about 5 months before the accident.

The airplane was equipped with leading-edge wing slats, but according to friends of the pilot, they had been removed during the preceding year to increase the airplane's speed. The kit manufacturer stated that, while the airplane could be flown with the slats removed, the pilot should be aware that the glide ratio would be lower, thus increasing the area required for landing.

The airplane's maintenance logbooks were not located.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KNID,2230 ft msl	**Distance from Accident Site:**	16 Nautical Miles
Observation Time:	13:56 Local	**Direction from Accident Site:**	7°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	Unknown / Terrain-Induced
Wind Direction:		**Turbulence Severity Forecast/Actual:**	Unknown / Unknown
Altimeter Setting:	30.25 inches Hg	**Temperature/Dew Point:**	25°C / 1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Inyokern, CA (IYK)	**Type of Flight Plan Filed:**	None
Destination:	Randsburg, CA	**Type of Clearance:**	None
Departure Time:	13:49 Local	**Type of Airspace:**	Class G

One witness to the accident stated that wind was variable and gusting between 20 and 25 knots. He did not see any dust devils or dust disturbance on the ground. Another witness described the wind as gusting and generally out of the north.

The airstrip was equipped with a windsock at its west end, just south of the runway. At the time of the accident, it was not in use, having been blown over during a recent storm.

A pilot who routinely visited the airstrip stated that he landed shortly after the accident and although the windsock was immobilized, there were multiple campers and off-highway

vehicles all flying flags in the recreational area surrounding the airstrip. He estimated that, by the time he landed, the wind was about 10 kts out of the southeast, which he stated was extremely unusual for the area, as they were predominantly out of the west or the southwest.

Airport Information

Airport:	Goler Heights Airstrip NONE	**Runway Surface Type:**	Dirt;Gravel
Airport Elevation:	2475 ft msl	**Runway Surface Condition:**	Dry;Holes;Rough;Soft;Vegetation
Runway Used:	25	**IFR Approach:**	None
Runway Length/Width:	1750 ft / 35 ft	**VFR Approach/Landing:**	Full stop

The airstrip was located within Bureau of Land Management land and was not identified on any FAA chart or the FAA Airport Facilities Directory. Kern Valley Airport had prepared an unofficial, “SoCal Backcountry Airstrip Guide.” The guide advised a traffic pattern altitude of 3,300 ft msl (830 ft agl), and recommended landing and taking off to the west, weather permitting, due to terrain.

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	35.429426,-117.73031

The airplane came to rest inverted on a heading of about 035°, in the foothills of the rising terrain of the Red Rock Canyon State Park to the north, about 700 ft short of the southwest runway landing threshold.

The first identified point of impact was a ground disruption that contained fragments of propeller blades and three equally-spaced indentations that matched the lateral dimensions of the nose and main landing gear. The disruption continued on a heading of about 215° true for 75 ft to the main wreckage.

The entire fuselage through to the leading edge of the horizontal stabilizer, along with most of the right wing and the inboard section of the left wing, sustained extensive crush damage and thermal damage that melted most of the aluminum structure. The horizontal stabilizer and rudder/vertical stabilizer assembly remained intact and came to rest in line with the burnt fuselage remnants. The leading-edge wing slats were not located and appeared to have been previously removed. There was no evidence of preexisting failure to any of the flight controls that had not been thermally destroyed. The flap position could not be determined, and the flight instruments were destroyed by fire.

The propeller blades had separated from the hub and were located in the debris field; both exhibited evidence of chordwise rotation. The engine was largely intact and remained attached to the airframe. Internal inspection did not reveal any evidence of catastrophic failure. The engine throttle controls and butterfly valve within the throttle body were at the high-power position.

There was no evidence of birdstrike to any of the fuselage or fractured canopy components. The burnt remnants of both seat belts indicated that the belt latches and tongues were locked.

Flight recorders

The Appareo Stratus 3 device sustained thermal damage and was sent to the NTSB Vehicle Recorders Division for data extraction. The data indicated that the unit was turned on while in motion, and because accuracy of multiple parameters is dependent on the device being calibrated while it is stationary, many of the recorded parameters were determined to be invalid. However, date/time, GPS position and ground speed appeared to be valid.

Medical and Pathological Information

Pilot

Kern County Sheriff-Coroner's Office performed the pilot's autopsy and reported his cause of death as multiple blunt force trauma. The autopsy identified an enlarged, dilated heart and moderate-to-severe aortic atherosclerosis, with no other significant natural disease.

Toxicological testing by the FAA Forensic Sciences laboratory detected dextromethorphan and its metabolite dextrorphan, loratadine and its metabolite desloratadine, and carvedilol in cavity blood and liver tissue.

Pilot Rated-Passenger

The passenger's most recent second-class FAA medical certificate was issued on February 15, 2019. At that time, he reported no medication use or active medical conditions.

According to his autopsy report, the cause of death was multiple blunt force trauma.

Additional Information

Although friends or family members could not provide specific details regarding the reason for the flight, social media posts indicated that the passenger was camping at the Kern Valley Airport (L05). The pilot sent a route plan to him the night before the accident. The route included multiple airports, backcountry airstrips, and waypoints all within the northern Mojave Desert east of Inyokern. The first waypoint was Goler Heights Airstrip.

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	Daniel Arland; FAA FSDO; Van Nuys, CA
Original Publish Date:	May 3, 2023
Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=104238

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available here.