



Aviation Investigation Final Report

Location:	Montebello, Virginia	Accident Number:	ERA23FA256
Date & Time:	June 4, 2023, 15:23 Local	Registration:	N611VG
Aircraft:	Cessna 560	Aircraft Damage:	Destroyed
Defining Event:	Unknown or undetermined	Injuries:	4 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and three passengers departed on a cross-country flight. Shortly after the airplane climbed through 26,600 ft, the pilot stopped responding to air traffic control instructions. According to ADS-B data, the airplane continued climbing to 34,000 ft, then flew at that altitude along its flight plan waypoints, turning southwest to overfly the intended destination about 1 hour later. The airplane continued flying for about another hour along a relatively constant track and altitude before entering a spiraling descent and impacting terrain.

United States Air Force (USAF) pilots intercepted the airplane about 2 minutes before it began the spiraling descent. They observed no breaches of the airplane structure or doors, no smoke in the cockpit or passenger cabin, and no oxygen masks deployed in the cabin. One occupant was observed slumped over in the pilot seat and no movement or other occupants were observed in the cabin.

Based on the lack of response to air traffic control communications, ADS-B data showing the airplane following its flight plan waypoints at the altitude last assigned by air traffic control, and the USAF pilot observations, it is likely that the pilot of the accident airplane became incapacitated during the climb to cruise altitude. It is also likely the airplane trajectory was then directed by the autopilot until a point at which it was no longer able to maintain control.

The pilot had medical conditions, including high blood pressure and high cholesterol, that represented some increased risk of an impairing or incapacitating cardiovascular event. In addition, the pilot had prior prescriptions for medications that could be impairing if used too recently before flight. However, there was no evidence of the pilot being at exceptionally high incapacitation risk, or of using medications inappropriately. Based on the accident

circumstances, it is likely that all the airplane occupants were incapacitated due to a common environmental condition, such as loss of cabin pressurization.

Maintenance records indicated that, at the time of the accident flight, five items were overdue for inspection, including the co-pilot oxygen mask. About 4 weeks before the accident flight, maintenance personnel noted 26 discrepancies that the owner declined to address, including several related to the pressurization and environmental control system. Furthermore, 2 days before the accident flight, maintenance personnel noted that the pilot-side oxygen mask was not installed, and the supplementary oxygen was at its minimum serviceable level. At that level, oxygen would not have been available to the airplane occupants and passenger oxygen masks would not have deployed in the event of a loss of pressurization. No evidence was found to indicate that the oxygen system was serviced or that the pilot-side oxygen mask was reinstalled before the accident flight.

Altitude-related hypoxia, although not verifiable from forensic medical evidence, likely explains the incapacitation of the airplane occupants. According to the FAA Pilot's Handbook of Aeronautical Knowledge, impairing effects from hypoxia are often vague and are experienced differently by different individuals; they include confusion, disorientation, diminished judgment and reactions, worsened motor coordination, difficulty communicating and performing simple tasks, a false sense of well-being, diminished consciousness, and, if conditions aren't remedied or mitigated, death.

Between 30,000 and 35,000 ft, the time of useful consciousness for a pilot to take protective action against hypoxia, including donning an oxygen mask and descending, is about 1/2 to 2 minutes. These times depend on multiple variables, including medical factors, with substantial variation among individuals. The times are decreased by about half when depressurization is rapid. However, gradual depressurization can be as dangerous or more dangerous than rapid depressurization because of its potential to insidiously impair a pilot's ability to recognize and respond to the developing emergency until the pilot is no longer effectively able to do so. Cognitive impairment from hypoxia makes it harder for affected individuals to recognize their own impairment.

Based on the available information, it is likely that the airplane occupants became hypoxic due to a lack of oxygen during the flight and became incapacitated. However, the reason for the loss of pressurization, and whether it was rapid or progressed over time, could not be determined.

Probable Cause and Findings

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

Pilot incapacitation due to loss of cabin pressure for undetermined reasons. Contributing to the accident was the pilot's and owner/operator's decision to operate the airplane without supplemental oxygen.

Findings

Personnel issues	Hypoxia/anoxia - Pilot
Personnel issues	Decision making/judgment - Pilot
Personnel issues	Decision making/judgment - Owner/builder
Aircraft	(general) - Not serviced/maintained

Factual Information

History of Flight

Enroute-climb to cruise	Unknown or undetermined (Defining event)
Enroute-climb to cruise	Cabin safety event

On June 4, 2023, at 1523 eastern daylight time, a Cessna Citation 560 airplane, N611VG, was destroyed when it was involved in an accident near Montebello, Virginia. The airline transport pilot and three passengers were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to flight track records and individuals familiar with the airplane’s flight activity the day of the accident, the airplane’s first flight of the day originated from its home airport of Melbourne International Airport (MLB), Melbourne, Florida, at 1059. The accident pilot conducted the flight as a single pilot without passengers and subsequently landed at Elizabethton Municipal Airport (0A9), Elizabethton, Tennessee, at 1231. While at 0A9, 300 gallons of fuel were added to the airplane and the three passengers were picked up. The accident flight departed 0A9 at 1313, destined for Long Island MacArthur Airport (ISP), Ronkonkoma, New York.

Review of FAA air traffic control audio recordings revealed that the pilot contacted the Atlanta Air Route Traffic Control Center shortly after takeoff and reported climbing through 9,300 ft mean sea level (msl) to 10,000 ft msl. The controller subsequently cleared the airplane to 23,000 ft pressure altitude and the pilot read back the clearance.

At 1322, the pilot was handed off to another controller within Atlanta Center. The pilot contacted the controller, advising that the airplane was maintaining 23,000 ft. The controller cleared the airplane to 29,000 ft and the pilot read back the clearance. At 1325, the controller cleared the airplane to 34,000 ft and the pilot read back the clearance. According to ADS-B data, the airplane was climbing through 26,600 ft at this time. At 1328, the controller amended the previous altitude clearance, instructing the pilot to stop the climb at 33,000 ft for crossing air traffic. The pilot did not respond to the amended clearance, and the airplane continued the climb to 34,000 ft and leveled off. No further radio transmissions from the pilot were received for the remainder of the flight, despite repeated attempts to contact the pilot.

Review of ADS-B data found that the airplane’s flight track to the destination airport was consistent with the filed flight plan route. The airplane arrived overhead of ISP at 1432, maintaining 34,000 ft throughout the flight. The airplane then continued flying southwest on a ground track of about 240°. The flight path showed little deviation in track angle or altitude until 1522, when the airplane entered a rapidly descending right spiral descent into terrain. The

the impact crater. The other engine was fragmented and located in the debris field. Blades/vanes on both engines were bent opposite the direction of rotation. Flight control continuity could not be established due to the fragmentation of the wreckage. A cockpit voice recorder was not located or recovered from the accident site.

The oxygen high pressure relief valve overboard discharge indicator was found intact. A bleed air flow valve and sections of ducting were also located in the debris. Two passenger oxygen masks were located, which remained attached to their respective box assemblies. One oxygen mask stowage/dropout box assembly and its oxygen shutoff valve were found capped with a dust cap rather than an approved AN cap. No other major portions of the oxygen or pressurization system were located in the debris. No evidence of any preaccident mechanical failures or malfunctions were found that would have precluded normal operation of the airplane or its subsystems.

According to the airframe manufacturer, the airplane's environmental control system used engine bleed air to pressurize and air condition the cabin, and to defog the cabin and cockpit windows. Flight crew controls for this system were located on the Pressurization – Environmental Control Panel at the front of the center pedestal. This panel included gauges for pressure differential (between the cabin and outside atmosphere), cabin altitude, and cabin altitude rate of change. Also included were controls for the desired cabin altitude, cabin altitude rate of change, cabin temperature, airflow distribution (between the passenger cabin and cockpit), and pressurization source. Flight crew could also use a guarded emergency dump switch to open the pressurization outflow valves and equalize the cabin altitude with airplane altitude up to about 13,000 ft ($\pm 1,500$ ft). The cockpit annunciator panel included a red "CAB ALT 10,000 FEET" light that would illuminate when the cabin pressure altitude was above 10,000 ft. This light would also trigger the master warning system, illuminating the master warning light.

Supplementary oxygen was provided to flight crew via sweep-on masks stowed in retainers below each cockpit side window and to passengers via continuous flow masks stowed in the cabin overhead panel at each seat. The passenger system oxygen flow was controlled by an electrically operated solenoid valve, which was actuated by an altitude pressure switch. In the event of a possible decompression, the altitude pressure switch was designed to actuate the solenoid valve between 12,900 to 14,100 ft cabin altitude. When the door actuators were energized with pressure from the supplementary oxygen tank, the stowage/dropout boxes would then open, releasing the masks.

Flight crew controls for the oxygen system were located on the left console. An oxygen control valve switch could be used to direct the flow of oxygen to flight crew only or to both flight crew and passengers; this switch could also be used to manually drop the passenger oxygen masks if they did not drop automatically. Flight crew and passenger supplementary oxygen was provided from a single 76 cubic ft bottle located in the tailcone compartment. When fully

charged, it would provide about one hour of oxygen for two flight crewmembers and six passengers. An oxygen pressure gauge was located on the right instrument panel.

According to Continuous Airworthiness Maintenance Program records for the airplane, 5 maintenance items were overdue on the date of the accident, including an inspection of the co-pilot oxygen mask. The most recent maintenance record was a discrepancy report from a visual inspection completed on May 10, 2023. This report listed 26 items, including the emergency exit door seal sticking out of the airplane, improper installation of the humidity regulator, and improper securing of the cabin temperature sensor. The airplane owner declined to address these items. The airplane was taken back to the same maintenance provider on June 1 because the pilot had reported a problem with avionics installed by a different maintenance shop the preceding April. During a visual inspection conducted on June 2, a mechanic from the maintenance provider observed that the airplane looked the same as it did on May 10, except that the pilot-side oxygen mask was not installed. The mechanic also noted that the oxygen level on the airplane was at its minimum servicing level before the airplane departed.

The airplane flight manual preflight cockpit inspection stated that flight crews were to check that oxygen masks were onboard. In addition, the before starting engines checklist included the following step:

Oxygen System - CHECK and STOW (With regulator set at 100% and EMER. Verify green band visible in O2 supply line). Check quantity gage at 1600-1800 PSI and crew masks connected to side console outlets. Pilot's side console oxygen control valve properly positioned to NORMAL. Caution should be exercised as inadvertently placing the oxygen control valve to MANUAL DROP will result in deployment of the cabin masks. The crew masks must be stowed in the quick donning hook and set on 100% for flight above FL 250.

Although the May 10, 2023, discrepancy report indicated that the airplane was equipped with a cockpit voice recorder (CVR), a CVR was not located at the accident site. The airplane was not equipped with a flight data recorder, nor was it required to be.

The pilot did not undergo autopsy or postmortem toxicology testing. Records from the pilot's primary care provider documented the pilot's medical history, which included high blood pressure, high cholesterol, obesity, and chronic low back pain.

At the time of his last primary care visit on February 6, 2023 (about 4 months before the accident), the medications used by the pilot were documented as losartan and amlodipine (prescription medications used to treat high blood pressure), low-dose aspirin and a fish oil supplement (over the counter medications commonly used to lower cardiovascular risk), omeprazole (an over-the-counter stomach acid suppression medication), and an albuterol inhaler as needed for cough. He was also instructed to restart rosuvastatin (a prescription medication for cholesterol control), which he had taken previously. These medications are not

generally considered impairing. At this visit, the pilot was prescribed a 90-day supply of phentermine (a stimulant typically used for short term treatment of obesity).

Records from the pilot's pain management specialist documented a history of low back pain since 2010. The pilot's last pain management visit was in September 2022, at which time the pilot was documented as taking hydrocodone, a prescription opioid pain medication, "very sparingly." Phentermine and hydrocodone often carry warnings that they may impair the ability to engage in potentially hazardous activities such as operating machinery or driving a motor vehicle. The FAA considers phentermine to be a "Do Not Issue/Do Not Fly" medication and instructs medical examiners not to issue medical certificates to pilots who use opioid medications regularly, although medical certificates may be issued in cases of occasional opioid use for time-limited conditions that are nonrecurrent or recurrent and resolved.

According to the FAA Pilot's Handbook of Aeronautical Knowledge, impairing effects from hypoxia are often vague and are experienced differently by different individuals; they include confusion, disorientation, diminished judgment and reactions, worsened motor coordination, difficulty communicating and performing simple tasks, a false sense of well-being, diminished consciousness, and, if conditions aren't remedied or mitigated, death.

Pilot Information

Certificate:	Airline transport	Age:	69, Male
Airplane Rating(s):	Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Unknown
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	
Medical Certification:	Class 1 With waivers/limitations	Last FAA Medical Exam:	October 10, 2022
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	April 15, 2023
Flight Time:	(Estimated) 34500 hours (Total, all aircraft), 850 hours (Total, this make and model), 29000 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N611VG
Model/Series:	560 Citation V	Aircraft Category:	Airplane
Year of Manufacture:	1990	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	560-0091
Landing Gear Type:	Retractable - Tricycle	Seats:	11
Date/Type of Last Inspection:	Unknown	Certified Max Gross Wt.:	15900 lbs
Time Since Last Inspection:		Engines:	2 Turbo fan
Airframe Total Time:		Engine Manufacturer:	Pratt & Whitney Canada
ELT:	Installed	Engine Model/Series:	JT150 5D
Registered Owner:	ENCORE MOTORS OF MELBOURNE INC	Rated Power:	
Operator:	ENCORE MOTORS OF MELBOURNE INC	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	CHO,631 ft msl	Distance from Accident Site:	33 Nautical Miles
Observation Time:	15:53 Local	Direction from Accident Site:	67°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Broken / 2900 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	6 knots / None	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	50°	Turbulence Severity Forecast/Actual:	N/A / N/A
Altimeter Setting:	30.01 inches Hg	Temperature/Dew Point:	21°C / 12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Elizabethton, TN (0A9)	Type of Flight Plan Filed:	IFR
Destination:	Ronkonkoma, NY (ISP)	Type of Clearance:	IFR
Departure Time:	13:13 Local	Type of Airspace:	Class A;Class G

Airport Information

Airport:	NONE NONE	Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	3 Fatal	Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Fatal	Latitude, Longitude:	37.921573,-79.103668

Administrative Information

Investigator In Charge (IIC):	Gerhardt, Adam
Additional Participating Persons:	Mitch A. Mitchell; FAA/AVP; Washington, DC Helen Tsai; Transportation Safety Board of Canada; Gatineau , OF Ricardo J. Asensio; Textron Aviation; Wichita, KS David Studtmann; Honeywell Aerospace; Phoenix, AZ Randolph W. Rushworth; Department of the United States Air Force; Washington, DC
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Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=192300

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](#).