

National Transportation Safety Board

Washington, DC 20594



Response to Petition for Reconsideration

March 17, 2022

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[REDACTED]

In accordance with Title 49 *Code of Federal Regulations* (CFR) 845.32, the National Transportation Safety Board (NTSB) has reviewed the August 26, 2019, petition for reconsideration and modification of the probable cause for the aircraft accident involving a Piper PA-22-150 airplane, N3664Z, on August 9, 2017, near Las Vegas, New Mexico (CEN17FA315). The petitioner, the senior vice president of the Aircraft Owners and Pilots Association's (AOPA) Air Safety Institute, has met the requirements for the NTSB's review of his petition; specifically, he has a direct interest in this accident investigation because of AOPA's role in promoting general aviation safety, and he has claimed that the NTSB's findings were erroneous.¹ On the basis of this review, the NTSB hereby grants this petition in part.

On August 9, 2017, about 1025 mountain daylight time, a Piper PA-22-150 airplane, N3664Z, impacted terrain near Las Vegas, New Mexico. The pilot was fatally injured, and the airplane was substantially damaged. The airplane was owned by the pilot and was operated as a 14 CFR Part 91 personal flight. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed.

The probable cause of the accident was approved on July 8, 2019. The probable cause was determined to be "the pilot's impairment or incapacitation by symptoms of an acute cardiac event, which resulted in a loss of control."

The petitioner asserted that the probable cause "is not fully supported, potentially misleading, and thus erroneous." The petitioner also asserted that "the

¹ At the time that the petition for reconsideration was submitted to the NTSB, the petitioner was the executive director of AOPA's Air Safety Institute.

attempt to establish...cardiac arrest as the cause of loss of control goes beyond the facts presented in the report and is purely speculation.”

Background

The pilot had recently purchased the accident airplane and had received 1.5 hours of instruction in the airplane on August 3 and 4, 2017. On the morning of the accident, the pilot departed Dalhart Municipal Airport (DHT), Dalhart, Texas, at 0640 central daylight time (0540 mountain daylight time) for Santa Fe Municipal Airport (SAF), Santa Fe, New Mexico. Radar data showed the airplane maneuvering near San Miguel Ranch Airport (NM53), Trementina, New Mexico, before radar contact was lost. The airplane wreckage was located in wooded, mountainous terrain near the private airport, which was about 73 miles east of the destination airport. The orientation of the wreckage was consistent with the airplane impacting terrain after an aerodynamic stall.

The autopsy of the 70-year-old pilot revealed severe coronary artery disease with 90% stenosis of the left coronary artery as well as evidence of scarring from a previous heart attack. Each of these conditions placed the pilot at significantly increased risk for the sudden development of symptoms from an acute cardiac event. The investigation determined that, while maneuvering for landing, the pilot was likely impaired or incapacitated by the symptoms of an acute cardiac event, which resulted in a subsequent loss of control.

The NTSB’s final report on this accident noted that the pilot did not hold a current Federal Aviation Administration (FAA) medical certificate and was operating under the provisions of BasicMed.² His BasicMed medical examination occurred in May 2017, but no information regarding the findings from that examination was available during either the NTSB’s initial investigation of this accident or the NTSB’s evaluation of the accident as part of our response to this petition for reconsideration.

Petitioner’s Claims

The petitioner claimed that “there is not sufficient evidence from the accident investigation and supporting documents to substantiate a probable cause determination of pilot impairment or incapacitation.” To support this claim, the petitioner provided an August 16, 2019, letter from a Professor of Medicine (Emeritus), Division of Cardiovascular Medicine, Stanford University, Stanford, California. In the letter, the cardiology expert stated that he had been provided a

² The pilot’s last FAA medical certificate was issued on May 17, 2012. General aviation pilots could begin flying under BasicMed on May 1, 2017. According to the FAA’s [BasicMed webpage](#) (accessed March 16, 2022), BasicMed “is an alternate way for pilots to fly without holding an FAA medical certificate as long as they meet certain requirements.” Those requirements are presented on the webpage.

copy of the pilot's autopsy report and found that "it is not possible to conclude that the autopsy findings suggest a probable cause of the aircraft accident related to the underlying pathologic presence of atherosclerotic heart disease" for the following reasons:

1. The absence of available neural tissue renders any observations of the central nervous system impossible. No information regarding cerebral hemorrhage, or other potentially fatal neurologic disease is available, therefore, no central nervous system cause of pilot incapacitation is justifiable.
2. Although the absence of pathological signs of acute myocardial infarction do not exclude the possibility of a very early infarction, there is no evidence of acute infarction, despite the manifest atherosclerotic CVD [cardiovascular disease] on autopsy.
3. Statements about cardiac chamber ventricular dilatation and hypertrophy shed no light on relationship to the accident. The enlargement of the heart, 'the mild four chamber dilation' and the 'fibrosis of the free wall' of the left ventricle establish the presence of long standing atherosclerotic cardiovascular disease but have no bearing on causative phenomena in the assessment of the aircraft accident.
4. Finally, although the possibility of fatal arrhythmia cannot be excluded from the case, there remains no pathological evidence supporting a rhythm disturbance.

In addition, the petitioner noted that the autopsy report listed the pilot's cause of death as multiple blunt force injuries and that the autopsy report did not include myocardial infarction as a precipitating factor. As a result, the petitioner stated that the cardiac issues noted in the autopsy report and the NTSB's accident report "are simply not medically sufficient to support a probable cause finding that a cardiac event triggered the loss of control."³

The petitioner acknowledged that a loss of control occurred during the flight but stated that "the radar track appears to depict a low altitude stall in the traffic pattern, consistent with a pilot unfamiliar with the area and losing focus on aircraft control while searching for or maneuvering to the runway." Also, the petitioner noted that the NTSB seemed to "dismiss" the pilot's relative inexperience in the airplane, his

³ The petitioner added that, although the NTSB report stated that "symptoms of an acute cardiac event likely led the pilot to divert," the pilot could have diverted for other reasons, including weather, especially given that the pilot had departed DHT for SAF on the day before the accident but returned to DHT due to weather. According to the reported conditions at 1005 (about 20 minutes before the accident) at the closest observation site to the accident location (29 nautical miles to the northwest), no significant weather was occurring near the accident site.

limited recent flying experience, and the circumstances of the flight.⁴ Regarding the pilot's limited recent flying experience, the petitioner stated that the pilot "had returned to flying in the recent months after a long layoff." Regarding the circumstances of the flight, the petitioner stated that the change in density altitude between DHT (which had an elevation of about 4,000 ft) and NM53 (which had an elevation of 6,300 ft) could have affected the airplane's low-altitude turning characteristics and engine performance, resulting in a situation in which a stall could quickly occur. The petitioner added that this scenario would be "in harmony with" the NTSB's finding that the orientation of the wreckage was consistent with the airplane impacting terrain after an aerodynamic stall.

In summary, according to the petitioner, the cause of this accident was consistent with a pilot of limited recent experience who, while operating at high density altitude in an airplane that was new to him, stalled the airplane low to the ground while maneuvering to the runway. The petitioner further stated that "it is not possible to conclude that the loss of control was caused by the pilot's impairment or incapacitation due to an acute cardiac event." As a result, the petitioner requested that the NTSB modify the probable cause to indicate a "loss of control for undetermined reasons" because it is "the only scenario supported by factual evidence presented in the accident report."

NTSB's Response

Title 49 *CFR* 845.32 states that "petitions based on a claim of erroneous findings shall set forth in detail the grounds upon which the claim is based." However, the NTSB's aviation accident final report and medical factual report for this accident contained almost all the autopsy information discussed in the letter from the petitioner's cardiology expert, as explained below.

First, the petitioner's cardiology expert stated that "the absence of available neural tissue renders any observations of the central nervous system impossible" and "no information regarding cerebral hemorrhage, or other potentially fatal neurologic disease is available, therefore, no central nervous system cause of pilot incapacitation is justifiable." The NTSB's final report discussed the development of symptoms from an acute *cardiac* event and not from an acute *cerebrovascular* event. Similarly, the probable cause referred specifically to impairment or incapacitation from an acute *cardiac* event. In addition, neither the final report nor the medical factual report mentioned a central nervous system cause for pilot incapacitation, and the medical

⁴ According to the NTSB's final report, the pilot had 19.1 hours of total flight experience in the accident airplane make and model and had accumulated 10.1 hours of flight experience (in all aircraft) during the 90 days before the accident occurred.

factual report stated that the autopsy of the pilot “was limited by the severity of injury; brain tissue was not available for examination.”

Second, the petitioner’s cardiology expert stated that “although the absence of pathological signs of acute myocardial infarction do not exclude the possibility of very early infarction, there is no evidence of acute infarction, despite the manifest atherosclerotic CVD on autopsy.” The NTSB’s final report made no mention of “acute infarction.”⁵ The report stated that “an autopsy of the pilot revealed severe coronary artery disease with 90% stenosis of the left coronary artery as well as evidence of scarring from a previous heart attack.” The report also stated that both those conditions “placed the pilot at significantly increased risk for the sudden development of symptoms from an acute cardiac event.”

Third, the petitioner’s cardiology expert stated that findings related to cardiac chamber ventricular dilatation and hypertrophy (enlargement of the heart, mild four-chamber dilation, and fibrosis of the left ventricle free wall) “shed no light on relationship to the accident” and “have no bearing of the causative phenomena in the assessment of the aircraft accident.” The NTSB notes that the presence or absence of medical findings is an essential part of its accident investigations. The medical findings showed significant cardiac disease and an elevated risk for an impairing or incapacitating event. Medical findings are evaluated in the context of operational evidence, mechanical evidence, pilot skills and experience, and other investigative findings.

Last, the petitioner’s cardiology expert stated that, “although the possibility of fatal arrhythmia cannot be excluded from the case, there remains no pathological evidence supporting a rhythm disturbance.” The NTSB notes that the petitioner’s cardiology expert was correct in stating that the possibility of a fatal arrhythmia could not be excluded from the case. However, the pilot did not have an internal or external cardiac device that recorded the rate and rhythm of his heart’s electrical activity. Because postmortem evidence for electrical activity was not available, neither the NTSB’s final report nor the medical factual report for this accident indicated that a rhythm disturbance occurred.

Nevertheless, in response to this petition for reconsideration, the NTSB reviewed the available evidence for this accident and determined that revisions to the findings and probable cause were warranted based on operational evidence. The flight track (as shown by radar data) indicated that, as the airplane traveled west, the pilot began following roads and terrain features as the terrain started rising and

⁵ An “acute infarction” refers to findings related to a clot that is clogging one of the coronary arteries, causing a heart attack (a myocardial infarction in medical terms). It typically takes more than 3 hours for the clot to cause findings that would be identifiable at autopsy. An “acute cardiac event” can describe an infarction but also ischemia (restricted blood flow) from the existing stenotic arteries or an arrhythmia from scar tissue and dilated chambers.

becoming uneven. The pilot then diverted and maneuvered the airplane into a “bowl” area that included the runway for NM53. Afterward, the pilot flew a right downwind leg and turned too closely onto the base leg to complete the base-to-final turn. As a result, the pilot made a 270° left turn inside the rim of the bowl area to align with the runway.

The airplane’s altitude and airspeed data through this point in the flight showed that the pilot was in control of the airplane, which indicated that the pilot was not incapacitated at the time that he diverted. As the pilot made the base-to-final turn, he again turned the airplane too closely to complete the turn, most likely because he allowed the bowl area to define the dimensions of the turn. Because of the unnecessary tightness of the turn and the steep bank angle that was required to prevent overshooting the runway, the airplane’s critical angle of attack was exceeded, resulting in an accelerated stall and a subsequent loss of airplane control.⁶

The accident site was aligned with the radar data point indicating the location where the pilot made the base-to-final turn, as shown in the figure below. The impact damage to the airplane (resulting from a near-vertical, nose-down descent into terrain) and the orientation of the wreckage (which was aligned with the runway) were both consistent with an accelerated stall.

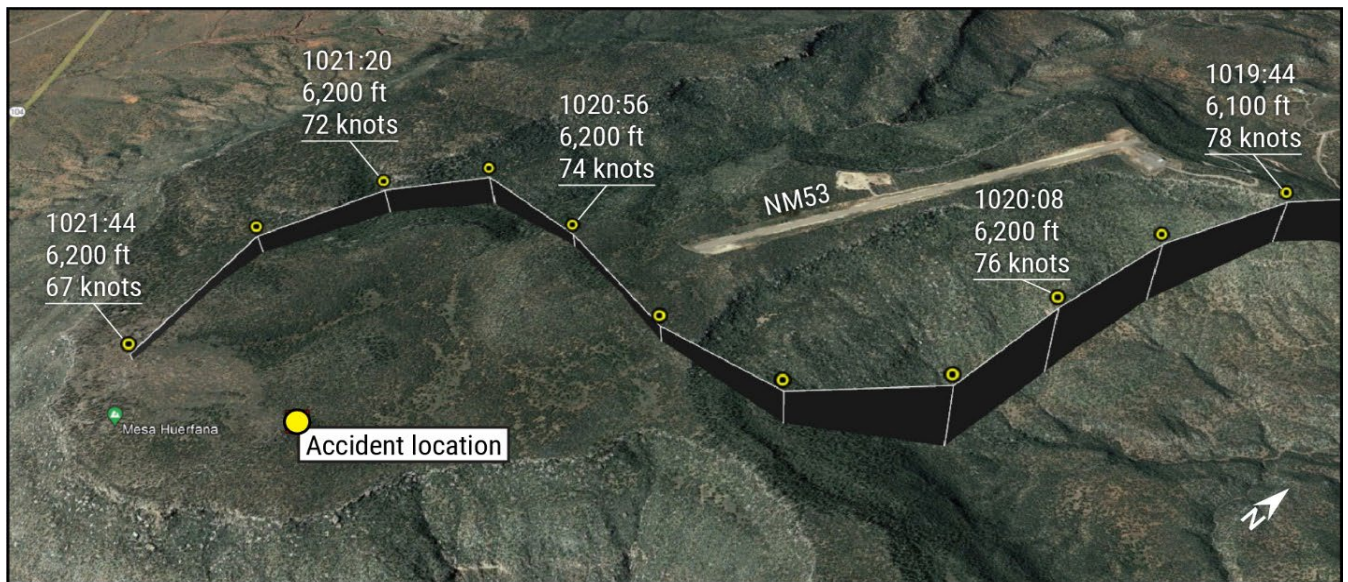


Figure. Accident site in relation to flight track and runway.

⁶ An accelerated stall has load factors above 1 G and speeds higher than the airplane’s 1-G stall speed. An accelerated stall can be encountered when a pilot increases the airplane’s angle of attack rapidly. Accelerated stalls that result from abrupt maneuvers, such as aggressive banking, tend to be more rapid and severe than unaccelerated (1-G) stalls. A pilot’s failure to immediately address an accelerated stall can result in a loss of control.

The FAA's *Airplane Flying Handbook* (FAA-H-8083-3B) provided examples of the most frequent occurrences that result in inadvertent accelerated stalls; two of those occurrences were improperly executing turns and overshooting a base-to-final turn. Because the pilot would have wanted to prevent an overshoot, he was likely focused on that desired outcome instead of the need to maintain airspeed and the critical angle of attack. As a result, the increased load factor during the turn to final would have increased the airplane's stall speed above its 1-G stall speed (43 knots), causing the onset of the stall sooner than the pilot might have expected.

The petitioner asserted that a loss of control due to undetermined reasons was "the only scenario supported by factual evidence presented in the accident report" and requested that the NTSB modify the probable cause accordingly. Although the NTSB acknowledges that the original probable cause warrants revision, we do not agree with the petitioner that a loss of control for undetermined reasons is the only scenario supported by the evidence. As explained above, the factual evidence supports the finding that the pilot's loss of airplane control was due to an accelerated stall, and the final report has been revised to include this information.

Further, our review of the accident pilot's logbook revealed that he had accumulated most of his flight time in the Cessna 140 airplane, which is a small, high-wing tailwheel airplane with similar performance as the Piper PA-22-150 airplane. The pilot's logbook also revealed that he logged almost all his 344 hours of total flight experience (327 hours) during or before 2007, with most of those hours logged between 1983 and 1992.

After 2007, the pilot logged two flights totaling 1.9 hours in 2011; no other flights were logged between 2008 and 2016, even though the pilot's medical certificate was valid from May 2012 to May 2014.⁷ During May 2017, the pilot logged 3.2 hours in a Cessna 172 airplane for training and a flight review.⁸ Between August 3 and 6, 2017, the pilot logged 10 hours, including a total of 1.5 hours on August 3 and 4 for instruction after purchasing the accident airplane. Thus, the gap in the pilot's flight experience, his limited recent flight experience, and his limited instruction in the accident airplane did not prepare him for the challenges associated with the planned flight from DHT to SAF or the diversion to NM53, including the differences in airplane performance based on the density altitude.

⁷ The available evidence did not allow the NTSB to determine why the pilot underwent the medical examination necessary to fly yet logged no hours during the time that his medical certificate was valid. It is possible that the pilot logged flight time from May 2012 to May 2014 but did not account for those hours in his logbook. If the pilot logged flight time between June 2014 and May 2017, he would have done so without a valid medical certificate.

⁸ The NTSB notes that the pilot completed his BasicMed online medical course on May 19, 2017, which would have been the date that he could begin operating under BasicMed. However, the pilot logged flight time on May 15 and May 17, 2017.

Last, the NTSB notes that, given his cardiac issues, the pilot's decision to operate under the provisions of BasicMed is questionable. At the time of the pilot's most recent FAA medical certification examination in May 2012, he reported no medical conditions or the use of any medications. His certificate expired at the end of May 2014. Autopsy findings identified scarring from a previous heart attack, indicating that, at some point, the pilot experienced a medical event that would have required an FAA determination for granting a special issuance medical certificate. However, heart attacks can be silent; if the pilot had not noticed any symptoms, he might not have known about his cardiac disease.⁹

The pilot was required to take an online medical course before he could qualify for BasicMed. The course would have covered that a one-time special issuance was required for pilots with a medical history of myocardial infarction (heart attack). If the pilot was aware of his heart disease, the pilot should have recognized from his BasicMed training that he required a special issuance medical certificate.

Disposition

After review of the evidence, the petition for reconsideration of the NTSB's probable cause in connection with the aircraft accident involving a Piper PA-22-150 airplane, N3664Z, on August 9, 2017, near Las Vegas, New Mexico, is granted in part. The aviation accident final report has been modified as shown in the attachment.

Chair HOMENDY, Vice Chairman LANDSBERG, and Members GRAHAM and CHAPMAN concurred in this petition for reconsideration.

Attachment

Revised final report

⁹ The NTSB recognizes that the pilot might have had a silent heart attack, but the pilot was taking a medication that, among other things, controls hypertension after a heart attack. In addition, the pilot was taking at least one other medication to treat hypertension. At the time of the initial investigation, the NTSB did not obtain medical records from the pilot's personal healthcare providers to document his cardiovascular conditions.