Aviation Investigation Final Report

Location:	El Cajon, California	**Accident Number:**	WPR22FA068
Date & Time:	December 27, 2021, 19:14 Local	**Registration:**	N880Z
Aircraft:	GATES LEARJET CORPORATION 35A	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	4 Fatal
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

Earlier on the day of the accident, the flight crew had conducted a patient transfer from a remote airport to another nearby airport. Following the patient transfer, the flight crew departed under night conditions to return to their home base.

Review of air traffic control (ATC) communication, as well as cockpit voice recorder (CVR) recordings, showed that the flight crew initially was cleared on the RNAV (GPS) runway 17 instrument approach. The approach plate for the instrument approach stated that circling to runway 27R and 35 was not authorized at night.

Following the approach clearance, the flight crew discussed their intent to cancel the approach and circle to land on runway 27R. Additionally, the flight crew discussed with each other if they could see the runway. Once the flight crew established visual contact with the runway, they requested to squawk VFR, then the controller cleared them to land on runway 17. The flight crew then requested to land on runway 27. The controller asked the pilot if they wanted to cancel their instrument flight rules (IFR) flight plan, to which the pilot replied, “yes sir.” The controller acknowledged that the IFR cancellation was received and instructed the pilot to overfly the field and enter left traffic for runway 27R and cleared them to land.

Shortly after, the flight crew asked the controller if the runway lights for runway 27R could be increased; however, the controller informed them that the lights were already at 100 percent. Just before the controller’s response, the copilot, who was the pilot flying, then asked the captain “where is the runway.” As the flight crew maneuvered to a downwind leg, the captain told the copilot not to go any lower; the copilot requested that the captain tell him when to turn left. The captain told him to turn left about 10 seconds later. The copilot stated, “I see that little mountain, okay” followed by both the captain and co-pilot saying, “woah woah woah, speed,

speed" 3 seconds later. During the following 5 seconds, the captain and copilot both stated, "go around the mountain" followed by the captain saying, "this is dicey" and the co-pilot responding, "yeah it's very dicey." Shortly after, the captain told the copilot "here let me take it on this turn" followed by the co-pilot saying, "yes, you fly." The captain asked the copilot to watch his speed, and the copilot agreed. About 1 second later, the copilot stated, "speed speed speed, more more, more more, faster, faster… ." Soon after, the CVR indicated that the airplane impacted the terrain.

Automatic dependent surveillance – broadcast (ADS-B) data showed that at the time the flight crew reported the runway in sight, they were about 360 ft below the instrument approach minimum descent altitude (MDA), and upon crossing the published missed approach point they were 660 ft below the MDA. The data showed that the flight overflew the destination airport at an altitude of about 775 ft mean sea level (msl), or 407 ft above ground level (agl), and entered a left downwind for runway 27R. While on the downwind leg, the airplane descended to an altitude of 700 ft msl, then ascended to an altitude of 950 ft msl while on the base leg. The last recorded ADS-B target was at an altitude of 875 ft msl, or about 295 ft agl.

Examination of the accident site revealed that all major structural components of the airplane were present within the wreckage debris path. Wreckage and impact signatures were consistent with a nose-low impact with terrain. Postaccident examination of the engine revealed no evidence of any preimpact mechanical malfunctions or failures that would have precluded normal operation.

Information provided during interviews with the controller in charge (CIC), revealed that he was aware that the weather had been marginal visual flight rules (MVFR) for a while leading up to the time of the accident. He recalled the weather at the time of the accident as still being MVFR and did not recall it ever becoming IFR, and further stated he had not observed a change on the automated weather observing system (AWOS) display, which was located in the back of the tower cab and did not have an audible alert when weather conditions changed. At the time of the accident, the CIC was operating in a position responsible for conducting Limited Aviation Weather Reporting Station (LAWRS) augmentation.

According to information provided during interviews with the local control (LC) controller, he was aware that the weather had been marginal most of his shift. He recalled the weather at the time of the accident as still being MVFR and did not recall it ever becoming IFR. At the time of the event, he was not directly responsible for conducting LAWRS augmentation.

The AWOS one-minute data showed that the visibility had decreased to less than 3 miles visibility 7 minutes before the flight crew had checked in with tower controller on the instrument approach. The visibility remained below 3 miles throughout the instrument approach, cancelation of the IFR clearance, and accident sequence.

A performance study was conducted to determine the estimated airspeed, bank angle, and angle-of-attack. The study indicated that the flight crew likely exceeded the wings' critical

angle-of-attack, and the airplane entered an accelerated aerodynamic stall at a low altitude that would have not allowed time for recovery.

Probable Cause and Findings

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

The flight crew's decision to descend below the published MDA, cancel their IFR clearance to conduct an unauthorized circle-to-land approach to another runway while the airport was in nighttime IFR conditions, and the exceedance of the airplane's critical angle of attack, and subsequently entering an aerodynamic stall at a low altitude. Contributing to the accident was the tower crew's failure to monitor and augment the airport weather conditions as required, due in part to, the placement of the AWOS display in the tower cab and the lack of audible AWOS alerting.

Findings

Aircraft	Angle of attack - Not attained/maintained
Aircraft	Altitude - Not attained/maintained
Personnel issues	Decision making/judgment - Flight crew
Environmental issues	Low visibility - Decision related to condition
Personnel issues	Use of equip/system - ATC personnel
Personnel issues	Monitoring environment - ATC personnel
Personnel issues	Lack of action - ATC personnel
Environmental issues	Other weather service - Availability of related info
Environmental issues	Access to equipment/controls - Availability of related info

Factual Information

History of Flight

Approach-VFR pattern base	Loss of control in flight (Defining event)
Approach-VFR pattern base	Collision with terr/obj (non-CFIT)

On December 27, 2021, about 1914 Pacific standard time, a Gates Learjet Corporation 35A, N880Z, was destroyed when it was involved in an accident near El Cajon, California. The 2 pilots and 2 flight nurses were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 repositioning flight.

Earlier in the day, the flight crew had flown from Lake Havasu City Airport (HII), Lake Havasu, Arizona, to John Wayne/Orange County Airport (SNA), Santa Ana, California, for a patient transfer. They departed SNA about 1856 to reposition to their home base at Gillespie Field (SEE), El Cajon, California.

Review of communication recordings revealed that at 1908:23, the pilot contacted the SEE Air Traffic Control Tower (ATCT) and reported to the controller they were on the GPS approach to runway 17. The controller issued the current wind and cleared the pilot to land on runway 17. At 1912:03, the pilot reported the airport in sight and requested to squawk VFR. The controller did not acknowledge the request to squawk VFR; however, he reissued the landing clearance for runway 17.

At 1912:13, the pilot requested to land on runway 27. The controller asked the pilot if they wanted to cancel their IFR flight plan, to which the pilot replied, “yes sir.” The controller acknowledged that the IFR cancellation was received and instructed the pilot to overfly the field and enter left traffic for runway 27R and cleared them to land on runway 27R. At 1912:30, the pilot requested that the runway lights for runway 27R be increased; however, the controller informed them that the lights were already at 100 percent. No further radio communication between the pilots and the tower controller was heard.

Review of the CVR recording revealed that, following the approach clearance, the flight crew discussed their intent to cancel the approach and circle to land on runway 27R. Additionally, the flight crew asked one another if they could see the runway. Once the flight crew established visual contact with the runway, they requested to squawk VFR. The copilot, who was the pilot flying, asked the captain, “where is the runway” just before the controller noted that the lights were at 100 percent. About 3 seconds later, the copilot said “perfect, I got it now.” The captain asked the copilot two more times if he had the airport in sight; the copilot confirmed that he did and commented, “we’re gonna head right down the runway” and “then we’ll make a left.” About 12 seconds later, the captain stated “don’t go any lower” as the

copilot asked him to call the left turn. About 13 seconds later, the captain said, “make your left turn,” followed by him telling the copilot to straighten out 16 seconds later. The copilot asked the captain to tell him when to make a left turn, and 10 seconds later the captain told him to make the turn. The copilot stated, “I see that little mountain, okay” followed by both the captain and co-pilot saying “woah woah woah, speed, speed” 3 seconds later. During the following 5 seconds, the captain and copilot both stated, “go around the mountain,” followed by the captain saying, “this is dicey” and the copilot responding, “yeah it’s very dicey.” Shortly after, the captain told the copilot “here” let me take it on this turn” followed by the copilot saying, “yes, you fly.” The captain asked the copilot to watch his speed and the co-pilot agreed. About 1 second later the copilot stated, “speed speed speed, more more, more more, faster, faster.” Soon after, the CVR indicated that the airplane impacted the terrain.

ADS-B data showed that after departure from SNA, the flight made a left turn out over the waters of the Pacific Ocean and flew generally south-southeast along the coast and ascended to a cruise altitude of about 11,000 ft msl. After the flight passed Carlsbad, California, the airplane turned left and began to descend toward SEE. As shown in Figure 1, ADS-B data showed that the airplane was at 1,000 ft msl at the time flight crew reported the runway in sight. Additionally, as the airplane was abeam the HIRAK missed approach point, it was at an altitude of 700 ft msl. The data showed that the airplane overflew SEE at an altitude of about 775 ft msl (407 ft agl) and entered a left downwind for runway 27R. While on the downwind leg, the airplane descended to an altitude of 700 ft msl, then ascended to an altitude of 950 ft msl while on the base leg. The last recorded ADS-B target was at 1914:09, at an altitude of 875 ft msl, about 100 ft southeast of the accident site.

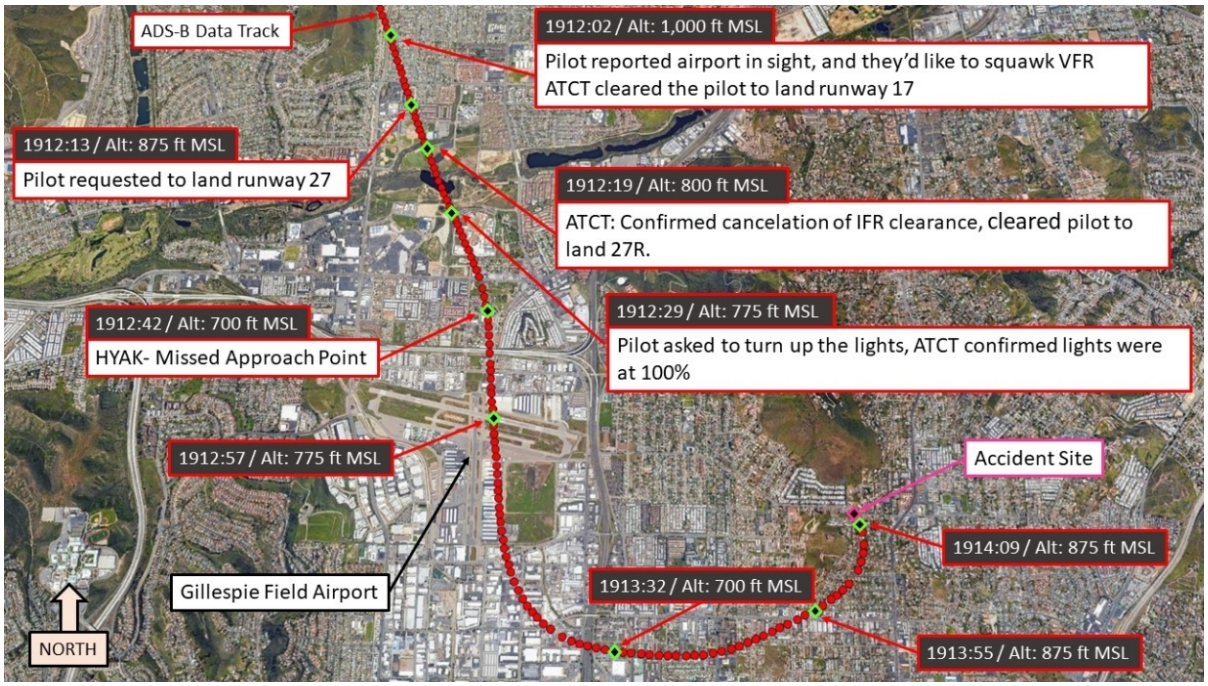

Figure 1: Recorded ADS-B data with ATC communication annotations.

Numerous witnesses located in the vicinity of the accident site reported observing various segments of the accident sequence. One witness stated that the airplane went over their residence extremely low when it made a “very hard steep turn to the left” and that the wing was “basically pointing straight down to the ground” before “it crashed.”

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	42,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:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	July 22, 2021
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 11, 2021
Flight Time:	2200 hours (Total, all aircraft)		

Co-pilot Information

Certificate:	Commercial	**Age:**	67,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):		**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	June 1, 2021
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 11, 2021
Flight Time:	1244 hours (Total, all aircraft)		

Captain

Aeromedavac hired the captain in June 2019, and had upgraded him to captain on July 16, 2021. The captain’s most recent proficiency check was completed on October 11, 2021.

Copilot

Aeromedavac hired the copilot in May 2019. The copilot's initial training was completed on May 13, 2019, with recurrent training completed on May 6, 2020, and May 16, 2021.

Aircraft and Owner/Operator Information

Aircraft Make:	GATES LEARJET CORPORATION	**Registration:**	N880Z
Model/Series:	35A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	591
Landing Gear Type:	Retractable - Tricycle	**Seats:**	10
Date/Type of Last Inspection:	May 5, 2021 Continuous airworthiness	**Certified Max Gross Wt.:**	18300 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:	13582.6 Hrs as of last inspection	**Engine Manufacturer:**	Honeywell
ELT:	Installed, not activated	**Engine Model/Series:**	TFE731-2-2B
Registered Owner:	MED JET LLC	**Rated Power:**	3500 Lbs thrust
Operator:	Aeromedevac Inc	**Operating Certificate(s) Held:**	On-demand air taxi (135)

The airplane was manufactured in 1985 and was configured for air medical transport. The airplane was equipped with various stall warning devices, angle of attack indicators, and a control stick shaker. The airplane had L and R STALL WARNING switches, located on the center switch panel, that provided power to the corresponding stall warning system. Each switch had two positions: On and Off. The L STALL WARNING switch also provided power for the stick pusher. According to the Flight Safety International Lear Jet 35/36 Pilot Training Manual, the stick shaker motors were attached to the front side of each control column. Actuation of the shaker caused a high-frequency vibration in the control columns.

Additionally, the airplane had two red L STALL and R STALL warning lights, located in the glareshield annunciator panel, that were installed to indicate an impending stall or a system malfunction. During flight operations, the lights would illuminate and flash when the stick shaker was activated. The lights were pulsed at the same frequency and duration as the shakers; therefore, the flash duration would increase as the angle of attack increased from initial shaker activation. At, or just before, pusher actuation, the flash duration was sufficient to cause the lights to appear steady. Steady illumination of the lights at any time other than pusher actuation indicated a computer loss or an internal malfunction. The lights would

illuminate whenever the STALL WARNING switches were off, and the battery (BAT) switches were on.

The wings-level stall speed published in the LearJet 35A Federal Aviation Administration (FAA)-Approved Airplane Flight Manual (AFM) at the landing flap setting and a gross weight of 14,350 lb is approximately 96 kts. The stall speed increases to 119 kts in a level 50° banked turn and to 134 kts in a 60° banked turn.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	KSEE,387 ft msl	**Distance from Accident Site:**	1.4 Nautical Miles
Observation Time:	18:55 Local	**Direction from Accident Site:**	280°
Lowest Cloud Condition:		**Visibility**	3 miles
Lowest Ceiling:	Broken / 2000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / Unknown
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	10°C / 8°C
Precipitation and Obscuration:	Moderate - None - Mist		
Departure Point:	Santa Ana, CA (SNA)	**Type of Flight Plan Filed:**	IFR
Destination:	El Cajon, CA	**Type of Clearance:**	IFR
Departure Time:	18:56 Local	**Type of Airspace:**	Class D

The most recent reported observation at SEE was issued at 1855, about 20 minutes before the accident, which reported variable wind at 5 knots, visibility 3 statute miles, mist, a broken cloud layer at 2,000 ft, overcast cloud layer at 2,600 ft, a temperature of 10°C, a dew point of 8°C, and an altimeter setting of 29.98 inches of mercury.

One-minute weather data was downloaded from the AWOS. The data showed that at 1901, visibility was 2.5 miles, broken cloud layer at 1,400 ft, broken cloud layer at 2,100 ft, broken cloud layer at 2,800 ft. The data showed that at 1908, when the flight crew contacted SEE ATCT, weather conditions included visibility 2 miles, few clouds at 900 ft, broken cloud layer at 1,500 ft, broken cloud layer at 1,800 ft. Recorded weather showed that at 1912, when the flight crew reported the airport in sight, weather conditions were visibility 2.5 miles, few clouds at 900 ft, broken cloud layer at 1,600 ft, and an overcast cloud layer at 2,800 ft. At the time of the accident, weather conditions were visibility 2.5 miles, few clouds at 1,000 ft, a broken cloud layer at 1,600 ft, and an overcast cloud layer at 2,800 ft.

According to FAA data, on the accident day and relative to the accident location, sunset occurred at 1649 and civil twilight ended at 1716.

Airmen's Meteorological Information (AIRMET) advisories for IFR conditions, mountain obscuration, moderate turbulence below FL180, low-level wind shear (LLWS) and moderate icing between the freezing level and 17,000 ft were active for the accident location at the accident time. The same AIRMETs for moderate turbulence below FL180 and LLWS were reissued at 1913.

A pilot report obtained at 1920, showed that the pilot(s) of a Citation 525 reported LLWS while on a 2-mile final to Mongomery Field Airport, San Diego, California, about 8 miles west of SEE.

14 *CFR* 91.155 outlines weather minimums for Visual Flight Rules. Class D and Class E airspace below 10,000 ft require visibility of 3 statute miles, 500 ft below clouds, 1,000 ft above clouds, and 2,000 ft horizontal distance from clouds.

Airport Information

Airport:	GILLESPIE FLD SEE	**Runway Surface Type:**	
Airport Elevation:	387 ft msl	**Runway Surface Condition:**	Wet
Runway Used:		**IFR Approach:**	RNAV
Runway Length/Width:		**VFR Approach/Landing:**	Full stop;Traffic pattern

Gillespie Field Airport (SEE) is a tower-controlled airport that operates under Class D airspace. The reported field elevation is 388 ft msl. The airport features 3 asphalt runways; runway 09L/27R, which is 5,342 ft long and 100 ft wide; runway 09R/27L, which is 2,738 ft long and 60 ft wide; and runway 17/35, which is 4,145 ft long and 100 ft wide. Runway 17 is equipped with an RNAV (GPS) instrument approach. The MDA for the localizer performance without vertical guidance (LP) for all categories was 1,360 ft msl. The approach plate notes that circling runway 27R and 35 was not authorized at night. The airport is also equipped AWOS.

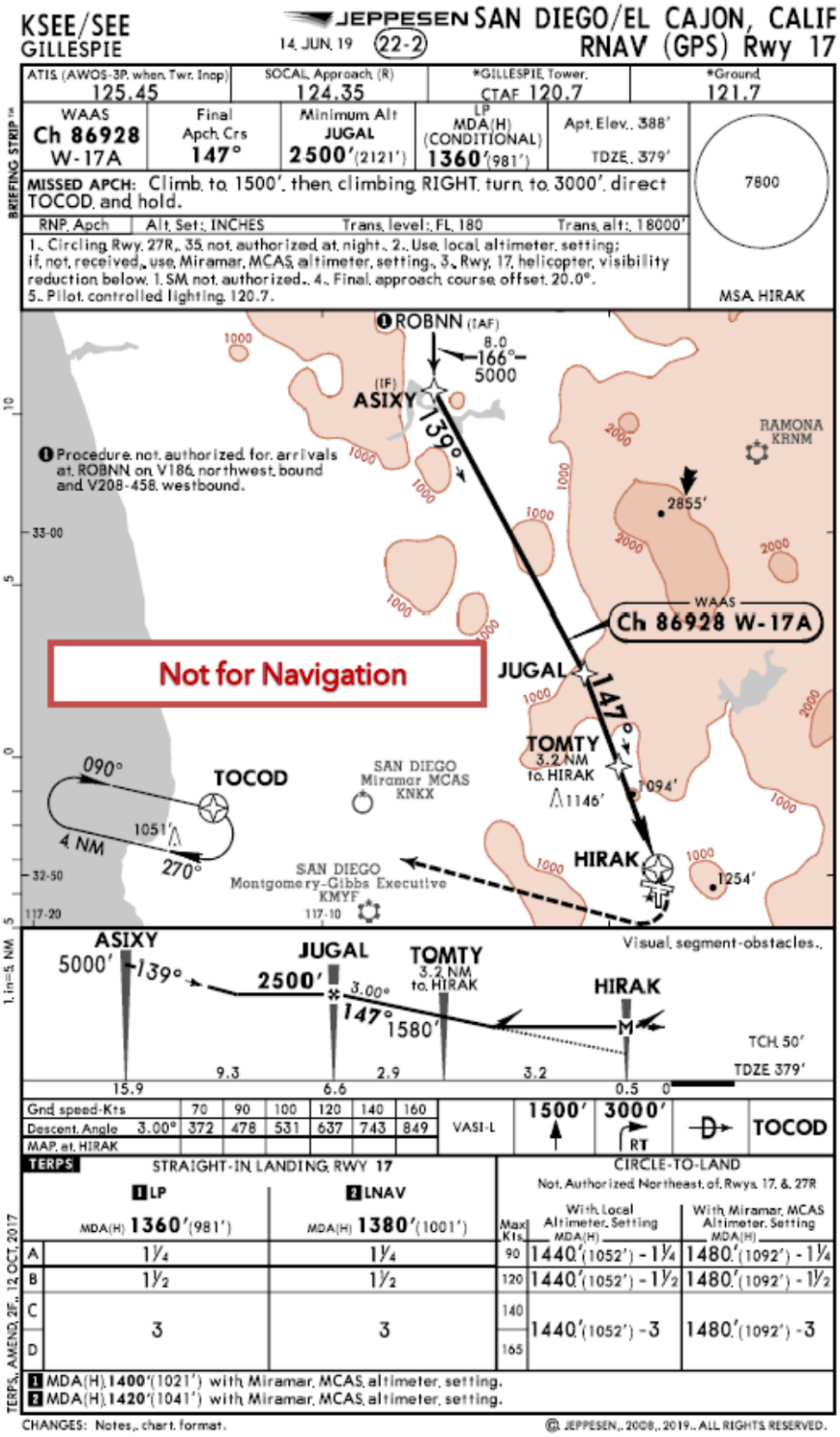

Figure 2: Runway 17 RNAV Instrument Approach Plate.

The ATCT at SEE was equipped with an AWOS display in the tower for controllers to maintain awareness of current weather conditions and was used to augment the local weather observations along with updating the automatic terminal information service (ATIS). The single display was located in the back of the tower cab, behind the controllers' providing services.

The data displayed was updated every minute and it was not equipped with audible alert capability.

The LC controller was working standalone from the LC position in the tower cab, which was normal for the time of day and operations. In an interview with the LC controller, he stated that he was aware that the weather had been MVFR, but did not recall it becoming IFR.

The CIC was working the Ground Control (GC), Clearance Delivery (CD), and Flight Data (FD) positions. In an interview with the CIC, he stated that he was aware that the weather had been MVFR for a while leading up to the time of the accident. He recalled the weather at the time of the accident as still being MVFR and did not recall it ever becoming IFR nor had he observed a change on the AWOS display.

SEE ATCT Order 7232.1, Standard Operating Procedures, Section 10, Team Responsibilities, outlines the rolls for each position. Part B, Flight Data/Clearance Delivery (FD/CD), states in part "…(4) Augment hourly weather observations."

FAA Order JO 7210.3CC, Facility Operations and Administration, Chapter 10, Section 1, General, paragraph 10-1-2, Tower/Radar Team Concepts, stated in part:
"There are no absolute divisions of responsibilities regarding position operations. The tasks to be completed remain the same whether one, two, or three people are working positions within a tower cab/facility/sector. The team, as a whole, has responsibility for the safe and efficient operation of the tower cab/facility/sector." (See Page 16 of the
ATC - Group Chair's Factual Report in the investigation docket for this accident, a link to which can be found at the end of this report.)

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	Unknown
Ground Injuries:		**Aircraft Explosion:**	Unknown
Total Injuries:	4 Fatal	**Latitude, Longitude:**	32.821182,-116.93942(est)

Examination of the accident site revealed that the airplane struck a set of power lines and subsequently impacted the yard of a residential home about 1.43 nautical miles east of the approach end of runway 27R. The airplane came to rest upright on a heading of about 118° at an elevation of about 595 ft msl. The wreckage debris path was oriented on a heading of about 310° and was about 186 ft long and 90 ft wide.

The first identified point of impact was a large crater, which contained the forward portion of the fuselage, including the nose cone area, portions of the instrument panel, and the upper windscreen structure. The remains of the fuselage extended about 42 ft from the crater to where the elevator control horn was found. The right wing was immediately next to and in a parallel orientation to the fuselage. Portions of the left and right horizontal stabilizer and elevators, rudder, and right engine were located adjacent to the elevator control horn. The left wing was located just beyond the area where most of the fuselage was found.

Extending from the fuselage, various debris was found, including both main landing gear, the left flap, portions of the left engine, and tip tank. All major structural components were located within the wreckage debris path.

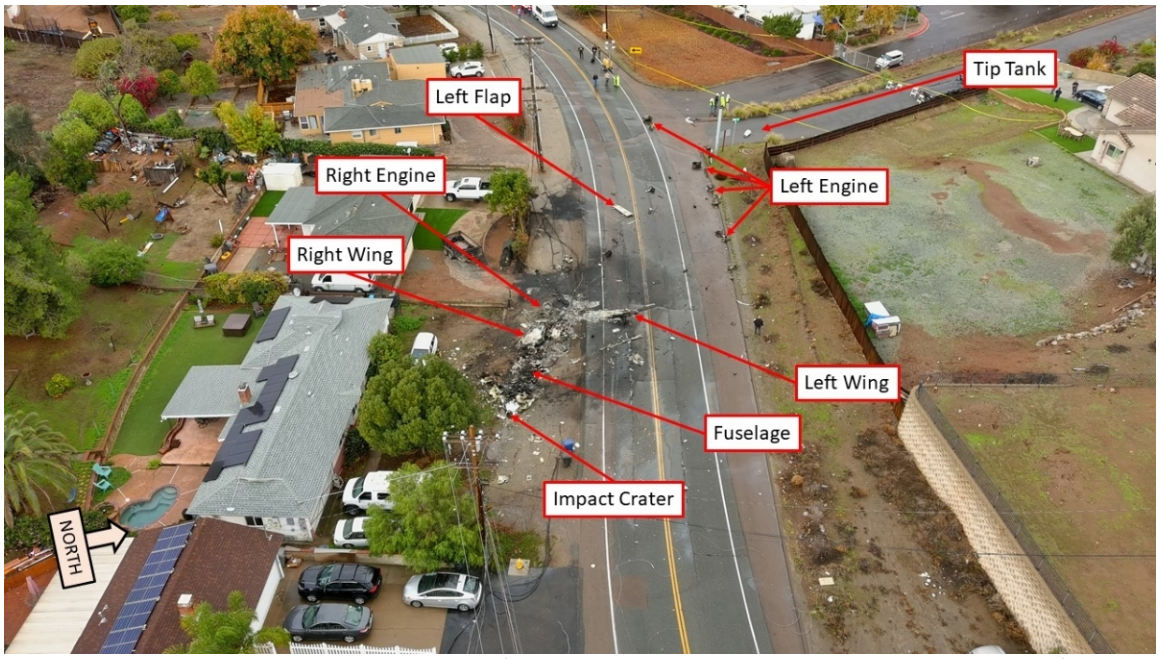

Figure 3: Accident site aerial photo (Courtesy of the San Diego Sheriff Office) with NTSB annotations.

Flight control continuity was established from the cockpit area throughout the airframe to all primary flight controls.

Various engine components were located throughout the debris path, which included numerous fan blades. The separated fan blades exhibited tearing and battering damage and bending opposite the direction of rotation. Several of the fan blades were torn mid-span of the blade. Various accessory gearbox internal gears were located along the debris field. Bypass stator vanes were located throughout the debris field, as were multiple stages of axial compressor blades.

Examination of the recovered airframe revealed that the forward part of the fuselage, including the cockpit, was impact and fire damaged. Remains of the control yokes were observed within

the recovered debris. The throttle quadrant was impact damaged; however, it was intact. The flap switch was positioned at about 20 degrees. The instrument panel was impact damaged with numerous instruments displaced. One altimeter indicated 100 ft with a setting of 29.99. One airspeed indicator was recovered and had what appeared to be a needle slap mark at about 190 knots. Remains of the caution light panel were found and exhibited impact/thermal damage with numerous light/switch displacement.

The left engine was examined using a borescope. All visible compressor stages were missing vanes and blades, with the blades and vanes present displaying tearing and battering. The trailing edge of the third stage nozzle vanes were battered with pitting present on the face of the vanes. Metal spray was present on the suction side of the third stage nozzle vanes.

The right engine was examined using a borescope. The internal areas of the right engine were examined. Metal spray was present on the suction side of the third stage nozzle vanes. The second stage axial compressor blades were bent opposite the direction of rotation. The third stage axial compressor blades displayed leading edge damage.

Medical and Pathological Information

Captain

An autopsy of the pilot was performed by the County of San Diego Medical Examiner, San Diego, California, which listed the cause of death as “multiple blunt force injuries.”

Toxicology testing performed at the FAA Forensic Sciences Laboratory found no drugs of abuse.

CoPilot

An autopsy of the pilot was performed by the County of San Diego Medical Examiner, San Diego, California, which listed the cause of death as “multiple blunt force injuries.”

Toxicology testing performed at the FAA Forensic Sciences Laboratory found no drugs of abuse.

Tests and Research

A performance study was performed and was based on ADS-B data provided by the FAA. Airspeed and airplane attitude information estimated from ADS-B data provided by the FAA showed bank angles greater than 60° were used to maneuver the airplane for an approach to landing on runway 27R.

Organizational and Management Information

Aeromedavac, Inc. was a Part 135 on-demand air ambulance charter company based in El Cajon, California (SEE). At the time of the accident, it had been in business for over 20 years and operated a Lear 35A and a Lear 31 for patient care, and a Lear 55 for organ transportation. Aeromedevac, Inc. used a registered nurse and a flight paramedic whenever a patient was transported. Aeromedevac, Inc. primarily operated within a 2,000-mile radius of San Diego, CA, as well as into Mexico.

Stabilized approach criteria for Aeromedevac, Inc. was defined and stated in their General Operating Manual (Section 13-3) as:

"Significant speed and configuration changes during an approach can seriously complicate tasks associated with aircraft control and increase the difficulty of properly evaluating an approach.

A pilot must begin formulating a decision concerning the probable success of an approach before reaching the decision point. This requires the pilot to be able to determine displacements from the course or glide path centerline, to mentally project the flight path to maintain the approach within the necessary parameters.

The above process is simplified by maintaining a stable approach speed, descent rate, vertical flight path and aircraft configuration during the final stages of the approach. This is known as a stabilized approach. A stabilized approach means that the aircraft is in a landing configuration, at the proper approach speed, and on the proper flight path at the final approach fix (FAF)."

Aeromedevac's Company Policy was:

“A stabilized approach must be established:

- At 1,000 feet above airport elevation during VFR or IFR approaches in VMC conditions.

- At the FAF above the airport during any straight-in or circling instrument approach in IMC conditions.

- At 1,000 feet above the airport during contact approaches. “

Preventing Similar Accidents

Circling Approaches: Know the Risks (SA-084)

The Problem

Circling approaches can be riskier than other types of approaches because they often require maneuvering at low altitude and low airspeed during the final segment of the approach, increasing the opportunity for loss of control or collision with terrain. These risks are heightened when conducting circling approaches in marginal or reduced visibility conditions and increased focus is required. While circling approaches might be necessary to accommodate traffic flow at airports, or are advantageous due to wind conditions, pilots sometimes do not evaluate the risks of these approaches fully before accepting them, which can result in unstabilized approaches.

Often, circling approaches do not allow for stabilized approach criteria to be met. Approaches should be stabilized by 1,000 feet height above touchdown (HAT) in instrument meteorological conditions (IMC), and by 500 feet HAT in visual meteorological conditions (VMC). When circling approaches are conducted in IMC, transitioning from instruments to ground references can cause the "illusion of high speed" if the instruments are not properly monitored.

What can you do?

- Fully understand the risks involved with performing a circling approach and use sound judgment if deciding to perform this approach.
- Consider your personal experience and limitations and the performance capabilities of your aircraft when planning the execution of the circling approach. Weather, runway configuration, and your aircraft's current position, altitude, and airspeed should also be considered.
- Understand that if ATC issues you a clearance for a circling approach, you can request a different approach or divert to an airport with more capable approach facilities. It is always better to make ATC aware of your concerns rather than to attempt an approach you might not be comfortable performing.
- Acquire recurring, scenario-based training in realistic environments that includes circling approaches. Practicing these approaches routinely will increase your proficiency and make you more comfortable performing them when needed.
- If you decide to perform a circling approach, conduct a comprehensive briefing that specifies when the circling approach will begin, descent altitudes and locations, airspeeds, aircraft configuration, and go-around (or missed approach) criteria and procedures.
- When conducting a circling approach, remain at or above the circling altitude until the aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal rate using normal maneuvers.
- To ensure the stabilized approach criteria are met while conducting a circling approach, it is imperative that pilots continuously monitor the airplane's altitude even when flying in VMC.

See https://www.ntsb.gov/Advocacy/safety-alerts/Documents/SA-084.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Cawthra, Joshua
Additional Participating Persons:	Jonathan Burgess; Federal Aviation Administration; San Diego, CA Brandon Johnson; National Air Traffic Controllers Association Jay Eller; Honeywell; Phoenix, AZ Allison Engel; Honeywell; Phoenix, AZ Michael Lemay; Bombardier Aviation; Quebec Richard Jones; Aeromedivac Inc.; El Cajon, CA David A. Gerlach ; Federal Aviation Administration; Washington, DC
Original Publish Date:	July 5, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=104445