National Transportation Safety Board
Office of Aviation Safety
Washington, DC 20594

WPR22FA068

OPERATIONAL FACTORS

Group Chair's Factual Report

June 15, 2023

A. ACCIDENT

Location: El Cajon, California
Date: December 27, 2021
Time: 1914 pacific standard time PST[1]
03:14 universal time coordinated, December 28, 2021
Airplane: Gates Lear Jet 35A, N880Z

B. OPERATIONAL FACTORS SPECIALIST

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[1] Pacific Standard Time

C. SUMMARY

On December 27, 2021, about 1914 Pacific standard time, a Gates Learjet 35A,[2] N880Z, departed controlled flight while on a circling approach to runway 27R at Gillespie field (SEE) El Cajon, California, and impacted a residential street. The pilot-in-command (PIC) and the second-in-command (SIC) died as well as two clinicians that were employed by the operator. No one on the ground was injured. The airplane was destroyed by impact forces and postcrash fire. The airplane was registered to Med Jet, LLC and was operated by Aeromedevac, Inc., under the provisions of Title 14 *Code of Federal Regulations* part 91 as a repositioning flight. Visual meteorological conditions prevailed, and an instrument flight rules (IFR[3]) flight plan was filed. The flight departed from John Wayne / Orange County airport (SNA), Santa Ana, California, about 1814 and was destined for SEE.

D. DETAILS OF THE INVESTIGATION

The Operations (Ops) Group Chairman launched to the accident site and was on scene from December 28, 2021, to January 1, 2022. The Ops Group Chairman requested FAA pilot records, company manuals, and documentation related to the accident flight.

On March 22, 2022, the Ops Group Chairman along with the IIC met in Tucson, AZ at the Flight Safety International Training Center to fly their Lear 35A simulator. In addition to flying the Lear 35A simulator the Ops Group documented the cockpit layout including the Angle of Attack gauge, stall warning system, stall switches and Master Caution annunciations. Circling approaches were also flown.

A review of the cockpit voice recorder (CVR) was conducted in the NTSB Recorders lab in Washington, DC on April 4, 2022.

D. FACTUAL INFORMATION

1.0 History of Flight

On the day of the accident, the flight crew had flown from Lake Havasu, Arizona, earlier in the day, to SNA, to drop off a patient. The crew and passengers remained at SNA for about 2 hours before they departed to relocate the airplane to their home base at SEE.

Radar 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

[2] Throughout the report, Gates Learjet 35A, Learjet and Lear will be used synonymously.

[3] Source: SKYbrary: IFR, Instrument Flight Rules (IFR) are rules which allow properly equipped aircraft to be flown under instrument meteorological conditions (IMC).

coast and ascended to a cruise altitude of about 11,000 feet above mean sea level (msl). After the flight passed Carlsbad, California, the track showed, the airplane turned left and began to descend toward SEE.

Review of communication recordings revealed that at 1908:23, the pilots contacted the SEE Air Traffic Control Tower (ATCT) and reported to the controller they were on the RNAV[4] GPS approach to runway 17. The tower 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[5], followed by the controller clearing them to land on 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 "affirmative." The controller instructed the pilot to overfly the field and enter left traffic for runway 27R. At 1912:29, 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.

Radar data showed that the airplane overflew SEE at an altitude of about 675 ft msl and entered a left downwind for runway 27R. While on downwind leg[6], the airplane had descended to an altitude of 625 ft msl[7], prior to ascending to 900 ft msl while on base leg[8]. The last recorded radar target was at 1914:10, at an altitude of 650 ft msl.

Examination of the accident site revealed that the airplane struck a set of power lines and subsequently came to rest in 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. All major structural components of the airplane were located throughout the wreckage debris path. The wreckage was recovered to a secure location for further examination.

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[4] Source: SKYbrary; RNAV is a method of navigation which permits the operation of an aircraft on any desired flight path; it allows its position to be continuously determined wherever it is rather than only along tracks between individual ground navigation aids.
[5] Source: SKYbrary; Visual Flight Rules (VFR) are the rules that govern the operation of aircraft in Visual Meteorological Conditions (VMC) (conditions in which flight solely by visual reference is possible).
[6] Source: FAA Aeronautical Information Manual; Downwind leg; A flight path parallel to the landing runway in the opposite direction of landing.
[7] Source; FAA. FAA Aeronautical Information Manual; Mean Sea Level
[8] Source: FAA Aeronautical Information Manual; A flight path at right angles to the landing runway off its approach end and extending from the downwind leg to the intersection of the extended runway centerline.

2.0 Flight Crew Information

The accident flight involved two flight crewmembers; the Captain and the SIC[9] as well as two clinicians that were employed by the operator.

2.1 The Captain

The captain was 42 years old and lived in Lakeside, California (CA). He held an Airline Transport Pilot certificate with an airplane multiengine land rating, commercial privileges for airplane single-engine land. The pilot also held a flight instructor certificate with airplane single-engine, multiengine land, and instrument airplane ratings. He held a first-class FAA medical certificate issued on July 22, 2021, with no limitations. On the application for this medical certificate, the pilot reported a total flight experience of 2,200 hours of which 120 hours were in the previous 6 months.

2.1.1 The Captain's Pilot Certification Record[10]

Notice of Disapproval – Private Pilot issued December 30, 1999. Areas of reexamination: Entire Practical Test. (1st Attempt)

Notice of Disapproval – Private Pilot issued January 22, 2000. Areas of reexamination: Entire Practical Test Except Area of Operation I Task H. (2nd Attempt)

Private Pilot – Airplane Single Engine Land certificate issued August 1, 2001.

Private Pilot – Airplane Single and Multiengine Land certificate issued January 21, 2003.

Private Pilot – Airplane Single and Multiengine Engine Land, Instrument Airplane certificate issued February 19, 2003

Commercial Pilot – Multiengine Land, Instrument Airplane, Private Privileges Airplane Single Land, certificate issued March 22, 2003.

Notice of Disapproval – Certified Flight Instructor Practical Test. Issued March 30, 2003. Areas of reexamination; Logbook Entries and Certificate Endorsements; Certificates and Documents.

Flight Instructor- Airplane Multiengine, Instrument Airplane, certificate issued April 10, 2003.

[9] Second In Command and co-pilot are synonymous with each other.
[10] Source: FAA

Commercial Pilot – Airplane Single and Multiengine Land, Instrument Airplane, certificate issued April 13, 2003.

Flight Instructor – Airplane Single Engine, Airplane Multiengine, Instrument Airplane, certificate issued April 14, 2003.

Commercial Pilot – Airplane Single Engine Land; Airplane Multiengine Land; LR-Jet; Instrument Airplane. Limitation: English Proficient; LR-JET[11] SIC Privileges Only, certificate issued June 17, 2019

Airline Transport Pilot – Airplane Multiengine Land; LR-JET; Commercial Pilot Privileges; Airplane Single Engine Land. Limitations, English Proficient; The LR-JET, is subject to Pilot-in Command Limitation(s) certificate issued June 13, 2020

2.1.2 The Pilot-in-Command Certificates and Ratings Held at Time of the Accident

AIRLINE TRANSPORT PILOT (issued June 13, 2020)
Airplane Multiengine Land
LR-JET
Commercial Pilot Privileges Airplane Single-Engine Land

MEDICAL CERTIFICATE FIRST CLASS (issued July 22, 2021)
Limitation: None

2.1.3 The Pilot-in-Command Training and Proficiency Checks Completed

A summary of the PIC's training events with Aeromedavac, Inc

Date of Hire	June 2019
Date Upgraded to Captain on Lear	July 16, 2021
Date of Most Recent Proficiency Training[12]	July 16, 2021
Date of Most Recent Proficiency Check (LR-Jet)[13]	October11, 2021

[11] Learjet, Inc. 35, , Source: FAA Order 8900.1 Figure 5-88, dated July 15, 2019.
[12] Title 14 *CFR* 135.293 required pilots to pass a written or oral test every 12 calendar months covering topics such as regulations, airplane systems, weight and balance, and weather, and a competency check covering maneuvers and procedures. The instrument proficiency check required by 14 *CFR* 135.297 may be substituted for the competency check required for the type of aircraft used in the check.
[13] The Captain's October 11, 2021, check included a 14 *CFR* 135.297(c) check, which required each PIC to receive an instrument proficiency check each 6 calendar months.

2.2 The First Officer, SIC

The SIC, age 67, held a commercial pilot certificate with airplane multiengine land, airplane single-engine land, and instrument airplane rating. The pilot also held a flight instructor certificate. He held a second-class FAA medical certificate issued on June 2, 2021, with the limitation of "must wear corrective lenses, possess glasses for near/intermediate vision." On the application for this medical certificate, the pilot reported a total flight experience of 1,244 hours of which 54 hours were in the previous 6 months.

2.2.1 The SIC's Certification Record

Student Pilot – Gliders, Passenger Carrying Prohibited, certificate issued March 31, 1978.

Private Pilot – Airplane, Single Engine Land, certificate issued June 25, 1979.

Private Pilot – Airplane, Single and Multiengine Land, certificate issued November 10, 1991.

Private Pilot – Airplane Single and Multiengine Land, Instrument Airplane, Multiengine Limited to VFR Only, certificate issued September 12, 2002.

Commercial Pilot – Airplane Single-Engine Land, Instrument Airplane, Private Privileges Airplane Multiengine Land, Airplane Multiengine VFR Only, certificate issued May 17, 2005.

Commercial Pilot – Airplane Single and Multiengine Land, Instrument Airplane, certificate issued July 27, 2006.

Ground Instructor – Advanced, certificate issued August 20, 2010

Commercial Pilot – Airplane Single and Multiengine Land; LR-Jet, Instrument Airplane, Limitations, English Proficient; LR-Jet SIC[14] Privileges Only, certificate issued May 14, 2019.

Notice of Disapproval – Flight Instructor Practical, Areas of Reexamination:

[14] Second in Command.

IV. Preflight Lesson on a Maneuver to be Performed in flight; IX. Performance Maneuvers; V. Preflight Procedures; VI. Airport and Seaplane Base Operations; VII. Takeoffs Landings and Go-Arounds; VII. Fundamentals of Flight; X. Ground Reference Maneuvers; XI, Slow Flight, Stalls and Spins; XII. Basic Instrument Maneuvers; XIII. Emergency Operations; XIV. Postflight procedures; certificate issued October 14, 2011.

Flight Instructor – Airplane Single Engine, certificate issued November 8, 2011.

Flight Instructor – Airplane Single Engine, certificate reissued November 19, 2013.

Flight Instructor – Airplane Single Engine, , certificate reissued November 19, 2015.

Flight Instructor – Airplane Single Engine certificate reissued November 20, 2017.

Flight Instructor – Airplane Single Engine, certificate re issued November 29, 2019.

2.2.2 The SIC's Certificates and Ratings Held at the Time of the accident.

Commercial Pilot (issued May 14, 2019)
Airplane Single and Multiengine Land; LR-Jet, Instrument Airplane

MEDICAL CERTIFICATE Second-class (issued June 2, 2021)
Limitation: Must wear corrective lenses, possess glasses for near/intermediate vision

3.0 PRIA Information

The "Pilot Records Improvement Act of 1996" (PRIA) required that a hiring air carrier under 14 *CFR* Parts 121 and 135, or a hiring air operator under 14 *CFR* Part 125, request, receive, and evaluate certain information concerning a pilot/applicant's training, experience, qualification, and safety background, before allowing that individual to begin service as a pilot with their company. According to the FAA, the previous employer was required to provide the following:

1. Records pertaining to the individual, found in – 49 U.S.C. Section 44703 (h) (1) (B) (i)
2. Records pertaining to the individual's performance as a pilot, found in 49 U.S.C. Section 44703 (h) (1) (B) (ii).

According to the Director of Operations, Aeromedevac was compliant with all PRIA request for pilot information before any pilot was hired.

4.0 Medical and Pathological Information

Toxicology testing was performed at the FAA Civil Aerospace Medical Institute (CAMI).[15]

[15] The pilot toxicology results can be reviewed in the public docket for this accident.

5.0 Airplane Information

Figure 1: Actual accident aircraft; Source: Jetphotos.com

The accident airplane was a Lear 35A, registration number N880Z, serial number 35A-951. It was a fixed wing multiengine aircraft with two Garrett TFE-731-SER turbine-fan engines. The airplane was manufactured in 2006 and was registered to Aeromedevac, Inc. in El Cajon, California.

Under Operations Specifications A003, Aeromedevac Inc. was authorized to conduct operations under the provisions of 14 *CFR* Part 135 using the Lear 35A in passenger and cargo operations, under day/night, IFR enroute conditions, and in accordance with 14 *CFR* 119.21(a)(5) on-demand operations. The airplane was listed on Operations Specifications D085, issued to Aeromedevac Inc,

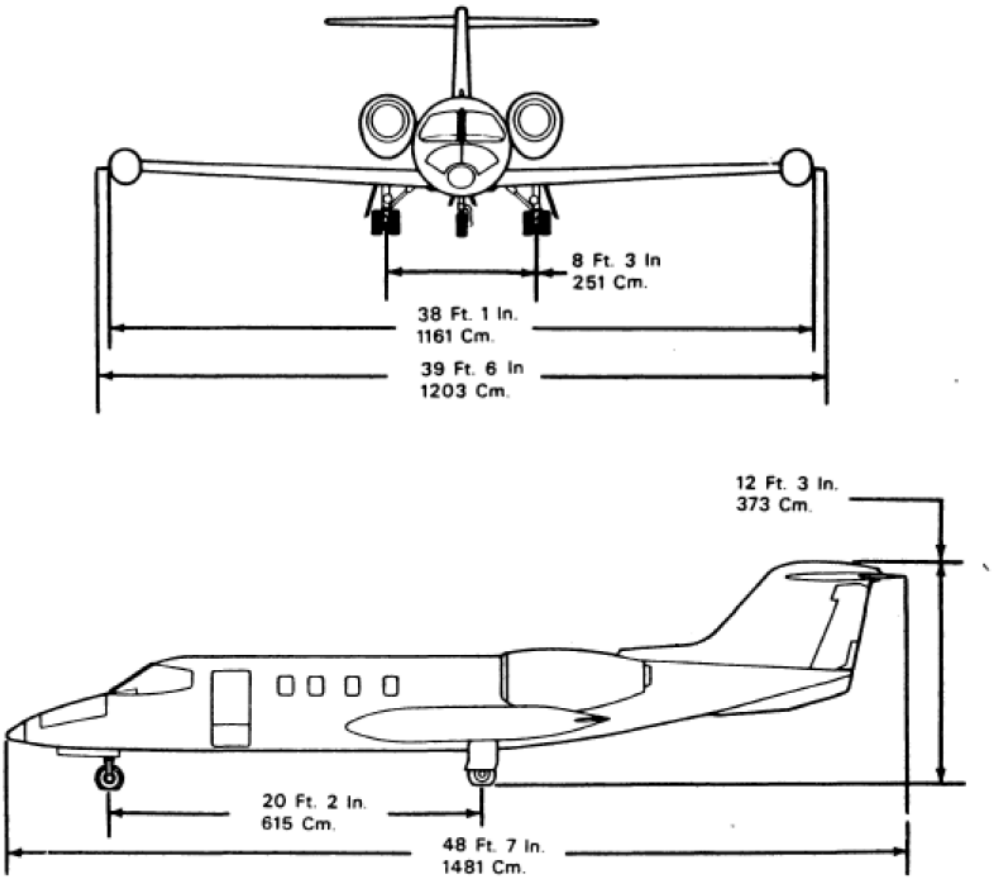

Figure 2: Lear 35A Dimensions

According to the Learjet 35A Airplane Flight Manual (AFM), page 1-1, the Lear 35A minimum crew was a pilot and co-pilot[16]. The Lear 35A was not approved for aerobatic maneuvers, including spins.

The Lear 35A AFM also included flight load acceleration limitations. For a configuration of Flaps Up, the Lear 35A was limited to +3.0g to -1.0g, and for a configuration of Flaps Down, the Lear 35A was limited to +2.0g to 0.0g. A note in the Lear 35A AFM (page 1-14) stated the following:

> *These acceleration values limit the bank angle in a level coordinated turn to 70º (flaps up) and 60º (flaps down). In addition, pullups and pushovers must be limited to these values.*

[16] Co-Pilot and SIC or Second in command is the same.

6.0 Meteorological Information

Automated weather issued by the SEE controllers during a period surrounding the accident time are presented here. The observation current at the time of the accident (bolded for emphasis) was issued at 1855 PST and reported a variable wind at 5 kts, visibility of 3 statute miles, mist, ceiling broken at 2,000 feet above ground level (agl), overcast clouds at 2,600 feet agl and an altimeter setting of 29.98 inches of mercury.

METAR KSEE 280147Z VRB06KT 10SM FEW029 BKN042 11/06 A2995
SPECI KSEE 280213Z VRB06KT 5SM BR FEW019 BKN026 11/07 A2997
METAR KSEE 280255Z VRB05KT 3SM BR BKN020 OVC026 10/08 A2998
METAR KSEE 280355Z VRB05KT 3SM BR SCT011 BKN020 11/09 A2996

For additional weather information at SEE at the time of the accident as well before and after the accident, see the Meteorologist Specialist factual in the docket associated with this accident.

7.0 Weight and Balance

Aeromedevac Operations Specification A096 defined the weight and balance program for the company's 14 *CFR* Part 135 flights. Aeromedevac's pilots were required to perform their own weight and balance calculations prior to every flight, based on the airplane's actual weight at the time of takeoff.

7.1 Estimated Weight and Balance

There was no record of the Aircraft Flight Log or other documents containing the accident flight's weight and balance being transmitted to Aeromedevac Air Ambulance. An estimated weight and balance, using the plane's estimated basic empty weight, fuel uplift records and estimated fuel burn from the SNA-SEE flight was derived from performance charts contained in the Lear 35A AFM[17] and is shown below. Weights are in lbs.

[17] Aircraft Flight Manual

WEIGHT & BALANCE (maximum certificated weights in **bold**)		
	Basic Empty Weight	10,173
	Pilot weights and **clinicians** (estimated)	600
	Baggage/Cargo Weight	100
	Zero Fuel Weight	10,873
	Maximum Zero Fuel Weight	**13,500**
	Fuel Weight (pounds)	3,400
	Ramp Weight	14,273
	Maximum Ramp Weight	**18,500**
	Taxi Fuel Burn	150
	Takeoff Weight (estimated)	14,123
	Maximum Takeoff Weight (landing limited)	**16,100**
	Estimated Fuel Burn (SNA-SEE)	800
	Estimated Weight on Landing (SEE)	14,300
	Maximum Landing Weight	15,300
	Landing VREF (knots for 40 degrees flaps	143

8.0 Accident Flight Authority (Part 91 versus Part 135)

Aeromedevac, Inc. was authorized to conduct operations with the Lear 35A under the provisions of 14 *CFR* Part 135 per their operating certificate issued under 14 *CFR* 119.21(a)(5). The Aeromedevac Director of Operations stated that the accident flight from SNA-SEE was operated under 14 *CFR* Part 91 as a re-positioning flight and was not subject to 14 *CFR* Part 135 regulations.[18]

The issuance and applicability of Aeromedevac's operations were defined in the company Operations Specifications A001, which stated the following in part:

d. The certificate holder is authorized to conduct flights under 14 CFR Part 91 for crewmember training, maintenance tests, ferrying, re-positioning, and the carriage of company officials using the applicable authorization in the operations specifications, without obtaining a Letter of Authorization, provided the flights are not conducted for compensation or hire and no charge of any kind is made for the conduct of the flights.

[18] An FAA legal interpretation (ref: Slater 2015 legal interpretation, dated November 17, 2015 stated in part: "*If the 'passenger-carrying revenue flights' were conducted as part 135 on-demand operations tail-end ferries under part 91 would be permitted"*

The FAA was asked by the NTSB for a legal interpretation of accident flight involving a Lear 35A from Philadelphia, PA (PHL) to Teterboro, New Jersey (TEB) CEN17MA183, to determine whether that flight was authorized to operate under 14 *CFR* Part 91. In an October 31, 2017, email to the NTSB, the FAA stated the following in part:

Research of the original intent of subparagraph d of the OpSpec reveals the intent was to eliminate the need or confusion regarding having to obtain a separate letter of authorization for the listed operations. The reference to compensation or hire was not in the initial language proposed for subparagraph d. In 2002, an amendment, meant to address operations under part 125, added the language to read "... provided the flights are not conducted for compensation or hire and no charge is made under the applicable provisions of parts 91 and 125. In 2003, due to changes in part 125, the verbiage was changed to "no charge of any kind is made for the conduct of the flights."

Repositioning flights can reasonably be characterized as ferry flights and the FAA interprets ferry flying to be "other commercial flying" which may be conducted under part 91 operating rules, pursuant to 119.1 (e)(3). These ferry flights can operate under 91.501(b)(1), when common carriage is not involved.

In order for these flights to be required to be conducted under 14 CFR part 135, certain requirements must be met. One of those requirements is that passengers and/or cargo are being transported for compensation or hire. As this was not the case with the flight from TEB to BED and PHL to TEB, these flights were not required to be conducted under part 135. While this operator may have appeared to conduct re-positioning flights contrary to the language contained in OpSpec A001, they did not do so contrary to the intent of that paragraph or in violation of 14 CFR part 135.

9.0 Airport Information

SEE was located about 10 miles NE of the central business district of San Diego at an elevation of 387.5 ft msl, and at a latitude/longitude of 32-49-34.4000N 116-58-20.8000W. The airport had six runways (17/35, 9L/27R, 9R/27L), and was served by an ATCT that operated from 0700-2100 local.[19] At the time of the accident the ATCT was in operation.

9.1 SEE RNAV (GPS) Runway 17

The accident flight was cleared for the RNAV (GPS) 17 approach. Runway 17 was 4,145 feet long and had a displaced threshold. The landing distance available beyond the threshold was 3,695 feet according to the Jeppesen 20-9A chart. The landing

[19] Source: AirNav: KSEE - Gillespie Field Airport

distance available was not sufficient for the Lear 35 and therefore it was not legal for the flight to land on runway 17.

The crew requested to the tower controller to cancel their IFR flight plan and land on runway 27. SEE had a runway 27L and 27R but the crew only requested to land on runway 27. Runway 27R was 5,342 feet long, 100 feet wide. The total landing distance available beyond the threshold was 4,636 feet[20] indicating a displaced threshold of 706 feet.

KSEE/SEE JEPPESEN SAN DIEGO/EL CAJON, CALIF
23 DEC 22 (20-9A) GILLESPIE

GENERAL

Coyotes and birds occasionally on and in vicinity of airport.
Rwy 27R centerline in close alignment with terrain, use of LOC/DME highly recommended.
Rwy 27R 1588'(1200') right traffic pattern dawn to dusk, left traffic dusk to dawn due to 893' AGL mountain 2.1 NM east-northeast of airport. Rwy 27L 1388' (1000') left traffic pattern dawn to dusk.

ADDITIONAL RUNWAY INFORMATION

RWY		USABLE LENGTHS LANDING BEYOND Threshold	Glide Slope	TAKE-OFF	WIDTH
9R ❶ 27L					60'
❶ Max GWT 12,500 lbs.					
9L	❷MIRL ❷PAPI-R (angle 3.75°)				100'
27R	❷MIRL ❷REIL ❷❸PAPI-L (angle 4.5°)	4636'			
❷ Activate on 120.7 when Twr inop. ❸ Unusable beyond 6° right of course.					
17	❹MIRL ❹VASI-L (angle 4.00°)	3695'			100'
35	❹MIRL ❹VASI-L (angle 4.50°)	3460'			
❹ Activate on 120.7 when Twr inop.					

Figure 3: Additional Runway information for SEE. Source Jeppesen.

[20] Source: Jeppesen SEE 10-9 chart.

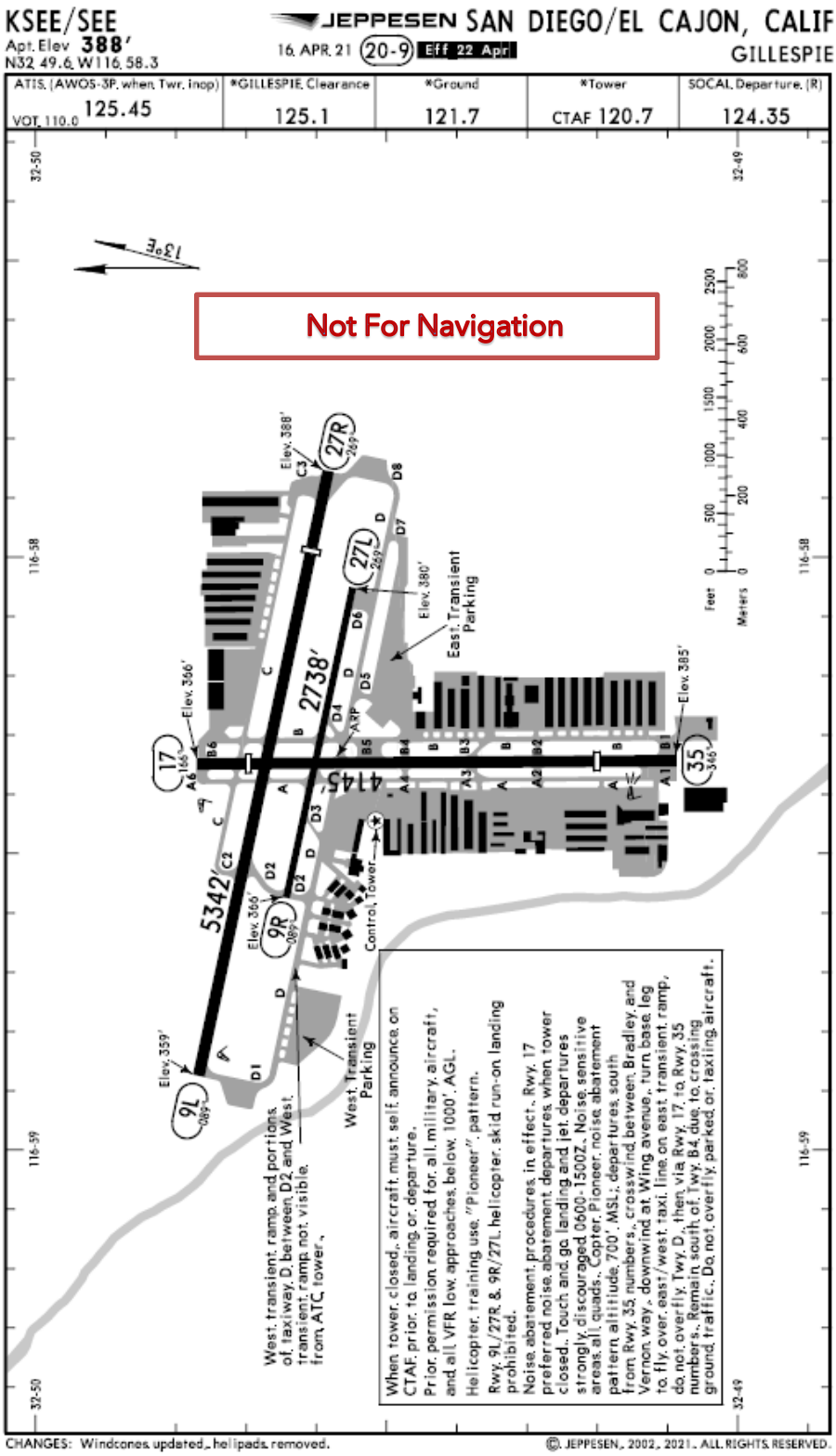

Figure 4: Jeppesen SEE 20-9 Airport Chart.[21]

[21] Source: Jeppesen. Aeromedavac Operations Specifications A009 authorized the use of Jeppesen charts and aeronautical data.

9.2 SEE RNAV (GPS) 17 Circle-to-Land 27R

Due to the weather at SEE on December 27, 2021, ATC issued the accident flight a clearance to execute the RNAV (GPS) 17 approach. The crew then cancelled their ATC flight plan and requested to fly VFR and land on runway 27. The SEE Tower then cancelled Aeromedevac's IFR clearance and cleared them to land on runway 27R with a VFR clearance. This allowed the crew to circle to land on runway 27R which they were unable to do legally if operating under an IFR flight plan, based on the approach plate note.

On the SEE 22-2 Jeppesen Approach chart that was current at the time of the accident for the RNAV (GPS) RWY 17, there was Note 1 that indicated "Circling RWY 27R, 35 not authorized at night." There was also a note in the profile view that indicated, "Circle-to-Land not Authorized Northeast of Rwy 17 & 27R." See figure 5, below.

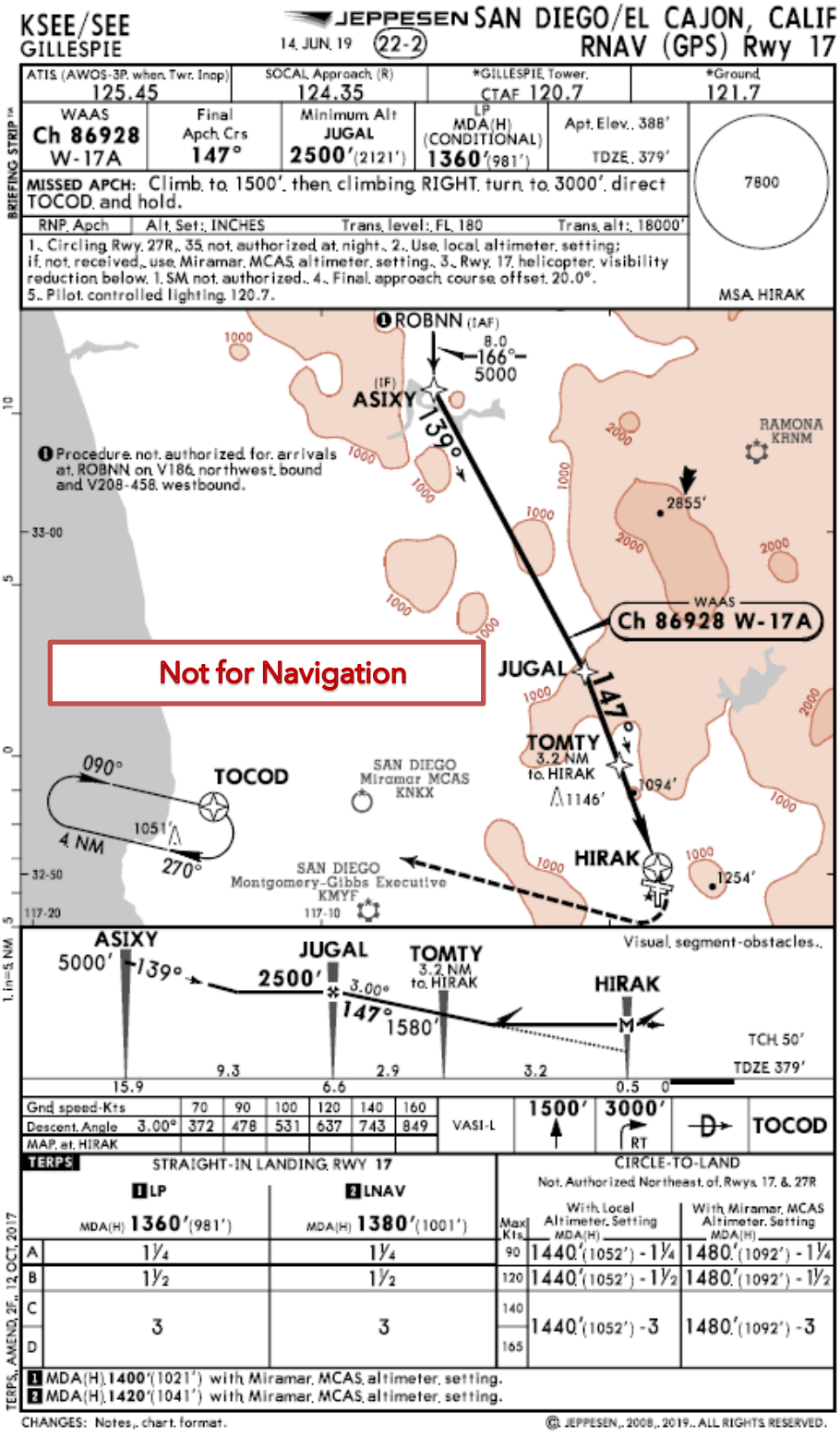

Figure 5: Jeppesen SEE 22-2 RNAV (GPS) Rwy 17 approach.

9.3 Circling Approach Protected Area

According to the Pilot/Controller Glossary published in the Aeronautical Information Manual (AIM), a circle-to-land was a maneuver initiated by the pilot to align the aircraft with a runway when a straight-in landing from an instrument approach was not possible or was not desirable. At tower-controlled airports, this maneuver was made only after ATC authorization had been obtained and the pilot had established required visual reference to the airport.

A "circle to runway" clearance is used by ATC to inform pilots they must circle to land because the runway in use was other than the runway aligned with the instrument approach procedure. The direction of the circling maneuver in relation to the airport/runway was required, the controller must state the direction (eight cardinal compass points) and specify a left or right downwind or base leg as appropriate. According to the AIM (page 5-4-20.1), standard left turns or specific instruction from the controller for maneuvering must be considered when circling to land.

Circling minimums were published on approach charts as a statement of the minimum descent altitude (MDA) required for the circling maneuver and the visibility requirements for the approach. Published circling minimums provided obstacle clearance when pilots remained within the appropriate area of protection. Pilots would determine the category of the airplane for the approach based on the approach speed of the airplane, which in turn would determine the MDA and visibility requirements for the circle-to-land approach as depicted on the approach chart. According to 14 *CFR* 97.3, an aircraft approach category means a grouping of aircraft based on a speed of VREF, if specified, or if VREF is not specified, 1.3 Vso at the maximum certificated landing weight.[22] The categories and speeds were as follows:

1. Category A: Speed less than 91 knots.
2. Category B: Speed 91 knots or more but less than 121 knots.
3. Category C: Speed 121 knots or more but less than 141 knots.
4. Category D: Speed 141 knots or more but less than 166 knots.
5. Category E: Speed 166 knots or more.

Note: The accident airplane would have been in Category D at the time of the accident.

"The FAA Instrument Procedures Handbook (FAA-H-8083-16A), page 4-8 and 4-9, stated that the circling approach area was the obstacle clearance area for airplanes maneuvering to land on a runway that does not meet the criteria for a straight-in

[22] VREF is defined as 1.3 times the stalling speed in the landing configuration (VSO). It is the required speed at the 50- foot height above the threshold end of the runway. Source: Pilot's Handbook of Aeronautical Knowledge, FAA-H-8083-25A, Chapter 10, page 10-32.

approach. A minimum of 300 feet of obstacle clearance was provided in the circling segment, and pilots should remain at or above the circling altitude depicted on the approach chart until the airplane was continuously in a position from which a descent to a landing on the intended runway could be made at a normal rate of descent and using normal maneuvers."

9.4 Obstruction Clearance

Obstruction clearance areas during the circling approach are depicted in the following figure. Distances are determined by the maximum IAS during the circling approach and are depicted in the table following the figure.

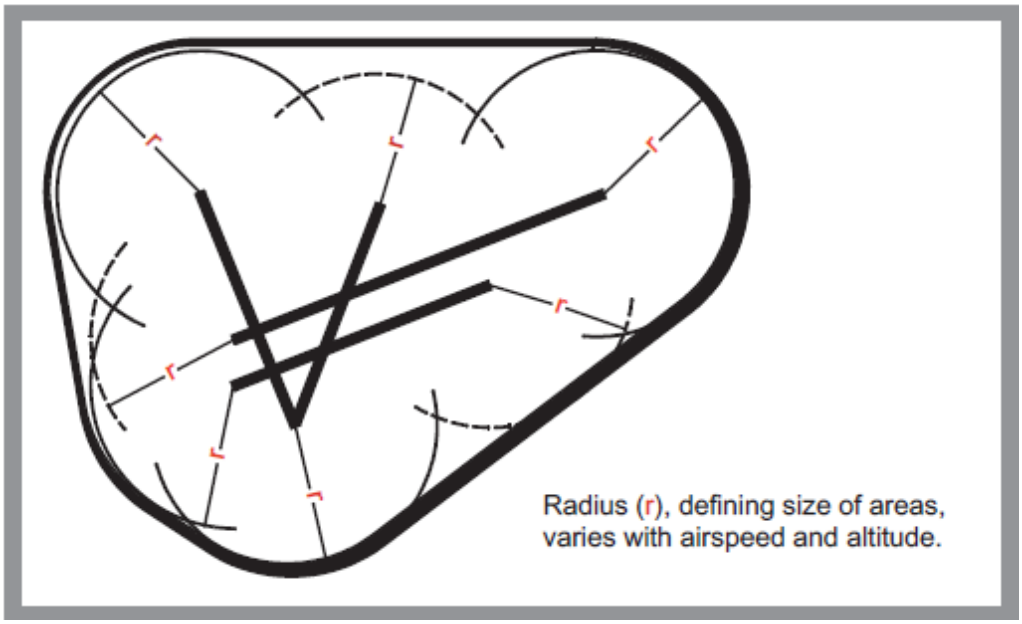

Figure 6: Protected airspace during a circling approach.

FAA	
Airplane Category	Circling Area Radius (r) from Threshold
C (max 140 KIAS)	1.7 NM
D (max 165 KIAS)	2.3 NM

ICAO	
Airplane Category	Circling Area Radius (r) from Threshold
C (max 180 KIAS)	4.2 NM
D (max 205 KIAS)	5.28 NM

Figure 7: Obstruction Clearance areas and airspeeds.

Figure 6 depicts an example of the Pre-2012 circling approach protected area. Approach Category and Circling radius Chart.

Figure 7 depicts an example of the pre-2012 circling approach protected area airspeeds.

According to the FAA, beginning with the November 15, 2012, chart publication date, the FAA began publishing new circling criteria (TERPS 8260.3B Change 21) that affected the circling approach area dimensions by expanding the areas to provide better obstacle protection. The new circling approach areas used an expanded radius distance from the runway and included a circling altitude which accounted for the true airspeed increase with altitude, dependent on aircraft category.[23]

Circling MDA in feet MSL	Approach Category and Circling Radius (NM)				
	CAT A	CAT B	CAT C	CAT D	CAT E
1000 or less	1.3	1.7	2.7	3.6	4.5
1001 – 3000	1.3	1.8	2.8	3.7	4.6
3001 – 5000	1.3	1.8	2.9	3.8	4.8
5001 – 7000	1.3	1.9	3.0	4.0	5.0
7001 – 9000	1.4	2.0	3.2	4.2	5.3
9001 and above	1.4	2.1	3.3	4.4	5.5

Figure 8: TERPS 8260.3B Change 21 modified circling approach areas.[24]

[23] Source: FAA Order 8260.3, United States Standard for Terminal Instrument Procedures (TERPS): TERPS/Landing Minima Data.
[24]Source: FAA

10.0 Company Information

Aeromedavac, Inc. was a Part-135 on-demand air ambulance charter company based in El Cajon, California (SEE). At the time of this writing/ 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.

10.1 Management Structure and Duties

The authorized management positions for Aeromedevac, Inc. were listed in the company's Operations Specifications A006, and included the Chief Pilot, Director of Operations, and Director of Maintenance. The Aeromedevac organizational structure was outlined in the Aeromedevac, Inc. General Operations Manual (GOM), Section 2.11.

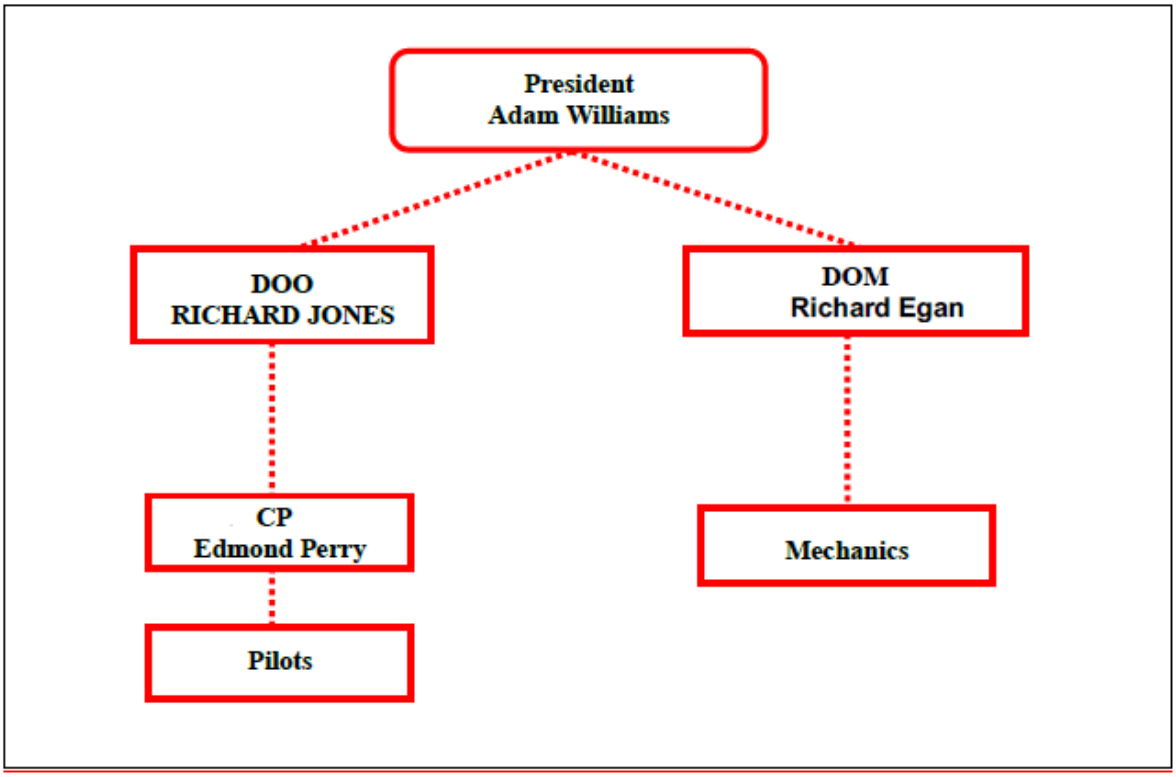

Figure 9: Aeromedevac, Inc. Management Organizational Chart.[25]

[25] Source: Aeromedevac GOM, Section 2.11.

10.1.1 Duties and Responsibilities of the Director of Operations

The duties for the Director of Operations (DO), were listed on the Aeromedevac, Inc. GOM (Section 2.13) and included the following:

1. *Formulates and directs the execution of overall company goals and objectives. He has the authority to direct all operational functions. Has also the responsibility to interpret and apply company policy and procedures. He reports directly to the President.*

2. *Is responsible for determining the content, form, and currency of records required to be kept by the FAA, such as 135.63, 135.323(c), flight locator training (if applicable), flight locating information [in accordance with 135.79(b)], and lease agreements [if appropriate, in accordance with 135.25(b)]. He is also responsible to make, upon request, these records available to the SAN FSDO[26]. He will maintain the records at the main operations base and will secure pilot records folders against unauthorized access.*
   Each folder will include a copy of the current medical certificate along with the required pilot record forms that can be found in an Appendix to this GOM. Also included in the pilot record folder will be training records and records to verify compliance with the Pilots Records Improvement Act (PRIA) of 1996. (See note below).

3. *Promptly reports accidents or incidents, to the FAA or NTSB as appropriate. Shares this responsibility with the DOM[27]. The person first notified of a reportable accident or incident, will make the appropriate notification.*

4. *Must have thorough knowledge of company operations, commonly accepted aviation safety standards and safe operating practices. He will have knowledge of applicable Federal Aviation Regulations, FAA Operations Specifications, FAA air carrier certificate, company Operations Manual (GOM), appropriate maintenance and airworthiness requirements and the Training Manual. He must discharge his duties to meet applicable legal requirements and maintain safe operations.*

5. *Hires and discharges personnel.*

6. *Has the overall responsibility to keep all the employees and other persons used in Aeromedevac operations informed of the provisions of the SAN FSDO issued Operations Specifications (OPSPECS) that apply to that person's duties and responsibilities.*

[26] Flight Standards District office.
[27] Director of Maintenance.

7. *Coordinates with other management personnel to ensure proper crew currency, certification, and airworthiness of the aircraft.*

8. *Develops new and improved flight operations policies and procedures.*

9. *Ensure that proper coordination exists with the DOM with respect to aircraft discrepancies, their resolution, and communication of aircraft airworthiness to the pilots.*

10. *Is the primary responsible for compliance with the Pilot Record Improvement Act (PRIA) of 1996.*

    The DOO/CP[28] will request pilot records in accordance with AC120-68. He will also ensure that, should records not be received in time, a new hire will not serve as a crewmember after 90 days. Should the DOO/CP have doubts about the history of a new hire, then such a person may receive training but will not be assigned to service until the records have been received according to PRIA.

    Note: *This act requires Part 135 operators to verify the validity of pilot/medical certificates and to request a violation history from the FAA for all new hire pilots. Operators of non-scheduled air carriers, and this applies to Aeromedevac, who operate aircraft with a maximum payload of 7,500 pounds or less, or helicopter operators, may hire, train and permit new pilots to begin service for a 90-day period before receiving records required under PRIA.*

11. *Has the responsibility to ensure that any aircraft exclusive use lease is current in accordance with FAR 135.25(b).*

12. *May delegate the authority for the accomplishment of specific duties to other personnel but retains the ultimate responsibility.*

10.1.2 Duties and Responsibilities of the Chief Pilot

The duties and responsibilities of the Chief Pilot, CP, as outlined in the Aeromedevac GOM, section 2.15 included the following:

1. *The CP reports to the DO.*

[28] DOO/CP is the Director of Operations/ Chief Pilot

2. *Coordinates aircraft maintenance with the DOM. This includes advising maintenance personnel of time remaining until the next inspection, and any operational limitations due to deferred MEL[29] items.*

3. *Is responsible for the currency of the operational information required by FARs 135.81 and 135.83: AIM, Parts 91 and 135; the appropriate AFM; cockpit checklists, and appropriate VFR and IFR aeronautical charts.*

4. *Is responsible for incorporating the latest revisions and distributing the operational information listed in #3 above.*

5. *Is responsible for the currency of the General Operations Manual (GOM) and the Training Program.*

6. *Directs the day-to-day ground and flight training of crewmembers and other non-maintenance personnel.*

7. *Distributes the GOM to company personnel.*

8. *Promptly reports accidents or incidents, to the FAA or NTSB as appropriate. The person first notified of a reportable accident or incident, will make the appropriate notification. (See GOM Section 6).*

9. *Will keep all the crewmembers informed of the provisions of the OPSPECS that apply to that person's duties and responsibilities.*

10. *Must have thorough knowledge of company operations, commonly accepted aviation safety standards and safe operating practices. He will have knowledge of applicable Federal Aviation Regulations, FAA issued OPSPECS, FAA air carrier certificate, company Operations Manual (GOM), appropriate maintenance and airworthiness requirements, and the Training Manual. He must discharge his duties to meet applicable legal requirements and maintain safe operations.*

11. *Assures that aircraft and equipment are available for training and testing of crewmembers.*

[29] MEL; Minimum Equipment List.

12. *Distributes information to crews pertaining to routes, airports, NOTAMs[30], NAVAID[31] changes/outages, changes in foreign flight requirements, etc.*

13. *Monitors the flight and duty time of all pilots.*

14. *Even though pilot information is available in the pilot record folders, to satisfy FAA operational control requirements, the CP is responsible for the maintenance of a separate list of pilots assigned to 135 duties by name and certificate number. He is responsible for the currency of this list.*

15. *Maintains proficiency as PIC in at least one aircraft used by the company for 135 operations.*

16. The DO/CP has the responsibility to be aware of FAA safety alert information, which is distributed via the Internet by Washington Flight Standards Service, directly to the operators. He also has the responsibility to disseminate this information, as appropriate to the flight crews.

Specifically, safety alert information consists of:
+ *Safety Alerts for Operators (SAFOs). SAFOs contain critical safety information.*
+ *Information for Operators (INFO). INFOs contain valuable information for operators, information that has relatively low urgency or impact on safety.*

SAFOs and INFOs may be incorporated into the GOM and the training program. In some cases, the DO/CP may find it more efficient to make flight crews aware of the latest information by communicating it through staff meetings or via written bulletins.

17. May delegate his duties to other personnel but retains responsibility for proper accomplishment.

10.1.3 Duties and Responsibilities of a Pilot-in-Command

The duties and responsibilities of the PIC, was outlined in the Aeromedevac, Inc. GOM, section 2.19 included the following:

[30] NOTAMS: Notice to Air Missions.
[31] NAVAID: A navigational aid (NAVAID), also known as aid to navigation (ATON), is any sort of signal, markers or guidance equipment which aids the traveler in navigation, usually nautical or aviation travel.

1. *Obtaining a weather briefing, applicable NOTAMs, and NOTAMs in the Airport Facility Directory (A/FD), as well as PIREPs prior to flight. (See Section 12: Flight Planning).*

2. *Filing a FAA or a company flight plan with the main base. All Part 135 operations will be on a FAA or company flight plan. No exceptions.*

3. *Ensuring that all applicable inspections have been completed and that the proposed flight time will not exceed the next inspection due, date, and/or time.*

4. *Ensuring that all mechanical irregularities from a previous flight have been cleared through corrective action or deferral and that the aircraft has been returned to service.*

5. *Computing weight and balance and completing a load manifest for ME aircraft. Observing the necessary precautions in passenger / baggage loading, in accordance with Sections 5 and 9 of this GOM.*

6. *Ensure the safety of boarding passengers on the ramp so that they are not subject to jet intakes and blasts, propellers, rotors, tripping hazards, ground equipment, and ramp vehicle operations. (See Section 9 of this GOM).*

7. *Briefing passengers on the requirement for no smoking while on the ramp or in the aircraft.*

8. *Pre-Takeoff briefing of passengers in accordance with Section 9 of this GOM. It is imperative that the PIC accomplishes this before taxiing to avoid a violation of FAR 135.100, "sterile cockpit" rule.*

9. *Assist and briefing passengers with disabilities.*

10. *Observe refueling at locations away from the main base. See Section 8 of this GOM.*

11. *Must be highly knowledgeable of the General Operations Manual (GOM), Federal Aviation Regulations applicable to the operation and OPSPECS.*

12. *Supervising the loading of cargo to avoid the carriage of HAZMAT[32]. See Section 16 of this GOM.*

[32] HAZMAT is an abbreviation for "hazardous materials"—substances in quantities or forms that may pose a reasonable risk to health, property, or the environment. Source: National Oceanic and Atmospheric Administration.

13. *It is a very clear company policy that if the PIC becomes aware of any conditions that preclude a safe operation, including hazardous airport or runway conditions or unruly / intoxicated passengers, the PIC shall not initiate a flight. If airborne, he/she will make a diversion to another airport to enhance safety.*

    Furthermore, given the above, if at all possible, the PIC should attempt to contact the DO/CP for additional guidance.

14. *Has the responsibility to ensure that he/she and the SIC (if applicable) are adequately rested and in proper attire.*

15. *Supervises the SIC (when applicable) to ensure proper flight planning, flight preparations and performance during flight.*

16. *Conducts a proper preflight of the aircraft or supervises the SIC in this task.*

17. *Ensures that he/she is and will be within flight and duty time limitations to complete the flight. Is responsible to keep the Flight and Duty Time log current.*

18. *Ensures that his/her flight bag contains all the necessary VFR and IFR charts, and a flashlight (with at least two D cells or equivalent).*

19. *At the end of the flight, writes up discrepancies noted during preflight and equipment / mechanical failures in-flight. Advises the DOO/CP and DOM if necessary. Reminder: discrepancies found during preflight must be either corrected or deferred via an approved MEL.*

20. *In the case of inoperative items, if an MEL has been approved by the SAN FSDO, ensures that the aircraft is operated strictly in accordance with the MEL provisions.*

21. *Before departure, makes the necessary calculations to ensure that the aircraft will meet the necessary performance requirements considering density altitude, runway length, obstacles, aircraft weight, etc., both at the point of departure and the destination.*

22. *Ensures that appropriate cabin supplies are on board for passenger carrying operations.*

23. *Reports directly to the DOO/CP and is responsible for the overall, safe, and efficient conduct of the flight. This includes operation of the aircraft at the most appropriate altitudes and routes considering weather, turbulence, oxygen requirements, and passenger comfort.*

24. *May delegate duties to the SIC (if there is one) but retains responsibility for proper accomplishment.*

10.1.4 Duties and Responsibilities of the Second-in-Command

The duties and responsibilities for the SIC was outlined in the Aeromedevac, Inc. GOM, section 2.21, included the following:

1. *The SIC is considered in training for the upgrade to Pilot-In-Command and is responsible for taking advantage of the Pilot-In-Command's experience, training, and instruction. He/she must prepare accordingly.*

2. *As the SIC gains knowledge and proficiency, increased responsibilities will be delegated by the PIC.*

3. *The SIC must be highly knowledgeable of the General Operations Manual (GOM), Federal Aviation Regulations applicable to the operation, OPSPECS, as well as commonly accepted industry safety standards and safe operating practices.*

4. *May be delegated duties as directed by the PIC and, therefore, must be familiar with the PIC duties outlined in the Par. 2.19 above.*

5. *For IFR flight, must maintain currency in compliance with FAR 135.245, that is, meet the recent instrument flight requirements of Part 61.57(c).*

6. *Must have a current FAR 135.293 competency check within the previous 12 months.*

11.0 Relevant Systems

11.1 Stall Warning System

The Lear 35A was equipped with a stall warning system to present the crew with visual and tactile warning of an impending stall. It included left and right stall vanes on the forward fuselage, a stick shaker, a stick nudger, a stick pusher, an angle of attack indicator for each crew position, L and R STALL warning lights, and L and R STALL warning switches. Flap position switches provided bias information to a computer-amplifier which would decrease stall indication speeds as the flaps went from 0° to 40°.

During flight, the stall warning vanes would align with the local airstream and transducers would produce a voltage proportional to the airplane angle of attack. The transducer signals were transmitted to the appropriate computer-amplifier channel along with the flap position information from the flap position switches and altitude information from the altitude switches.

As angle of attack increased to an angle of attack which corresponded to a speed approximately 7% above pusher speed for the appropriate configuration, the angle-of-attack indicator pointer would enter the yellow segment and the L and R STALL lights would illuminate and flash, and the stick shakers and the stick nudgers would activate. Should the angle-of-attack increase to a point just below aerodynamic stall, yaw damper force would be reduced, the angle-of-attack indicator pointers would enter the red segment, and the stick pusher (elevator servo) would command an aircraft nose-down attitude. The elevator servo force applied to the control column was approximately 50 pounds. The pusher force would remain until angle of attack was below the pusher angle-of-attack. During accelerated entry rate stalls, an angle-of-attack rate sensor circuit (alpha dot) would cause shaker, nudger and pusher activation at lower angle-of-attack.

The Flight Safety International Lear Jet 35/36 Pilot Training Manual stated in part:

During flight, the stall vanes align with the local airstream. Vane-operated transducers produce a voltage proportional to the aircraft angle of attack. These signals, biased by information from the flap position switches, and rate sensors (as appropriate) are sent to the respective computers.

As angle of attack increases, the indicator pointer moves to the right. As it crosses the green/yellow line, activation of the flashing STALL lights, stick shaker, and stick nudger (if installed) begins. If angle of attack is allowed to increase further, the pusher is activated as the pointer crosses the yellow / red line.

Assuming an unaccelerated entry to a stall condition at an altitude below 22,500 ft, the green / yellow line approximates 7 kts or 7% above the pusher speed, whichever is higher. The yellow / Red line approximates 5% above the stall speed (non-Alpha DOT); 1 kt. above stall speed (Alpha Dot). The 22,500 aneroids on all Alpha Dot aircraft cause warning and pusher functions to occur approximately 15 kts earlier at high altitudes in flaps up configurations.

11.1.1 Stall Warning Switches

The L and R STALL WARNING switches, located on the center switch panel, 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 puller.[33] From the wreckage examination, we were unable to tell if the stall warning switches were on or off at the time of the accident.

Figure 10: Source: NTSB Photo. Lear 35A Stall Warning Switches on Captains side forward instrument panel, indicated by red circle.[34] Picture taken inside an exemplar Lear 35.

11.1.2 Stick Shaker

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 causes a high-frequency vibration in the control columns.

11.1.3 Stick Nudger

Aircraft with the FC-530 AFCS[35] have a nudger incorporated into the stall warning system. As angle of attack increases slightly beyond the point of shaker motor operation but prior to pusher operation, a gentle pulsating forward push command was applied to the pitch servo (the same servo that operates the pushers).

[33] The stick puller function signaled the pitch servo to torque the elevators nose-up if MMO or 359 knots VMO (maximum operating limit speed) was exceeded.
[34] See Attachment 3 WPR21FA086 TUS Simulator Observation
[35] Automatic Flight Control System. The accident aircraft had this system.

If the nudger fails to operate, a pulsating nudger monitor horn sounds to alert the pilot. In this case, angle of attack must be decreased immediately because the pusher has also failed.

The Control Wheel Master Switch (MSW), located on the outboard horn of the pilot's and copilot's control wheels, provided a means of electrically disabling the stick nudger in the event of a malfunction. Depressing either switch would electrically disengage the elevator servo capstan, thereby removing elevator servo force at the elevator. When the switch was released, the capstan would reengage, and the pusher force would resume until disabled by other means.

11.2 Angle of Attack Indicators

The Control Wheel Master Switch (MSW), located on the outboard horn of the pilot's and copilot's control wheels, provided a means of electrically disabling the stick nudger in the event of a malfunction. Depressing either switch would electrically disengage the elevator servo capstan, thereby removing elevator servo force at the elevator. When the switch was released, the capstan would reengage, and the pusher force would resume until disabled by other means.

Figure 11: Photo of Lear 35A AOA gauge.[36]

11.2.1 Stall warning Lights

The red L STALL and R STALL warning lights, located in the glareshield annunciator panel, were installed to indicate 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 prior to 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.

[36] See Attachment 3 WPR21FA086 TUS Simulator Observation

Figure 12: Photo of Lear 35A stall warning lights.[37]

12.0 Relevant Procedures

12.1 Instrument Approach Procedures

According to the Aeromedevac, Inc. GOM (Section 13-4), pilots were required to review the instrument approach procedure prior to the final approach fix. At a minimum, this review should include the field elevation, the minimum safe altitude (MSA), the type of approach, the controlling minima, and the missed approach procedure. This section of the GOM also stated:

- *For all straight-in approaches conducted in IFR conditions, the Before Landing Checklist must be completed before the aircraft passes 1,000 feet above the elevation of the touchdown zone.*

[37] See Attachment 3 WPR21FA086 TUS Simulator Observation

- *For circling approaches conducted in IFR conditions, all checklist items except the final landing flap configuration must be completed before the aircraft passes 1,000 feet above the airport elevation, and the checklist must be completed before passing the MDA or 500 feet, whichever is lower.*

- *For approaches conducted in VFR conditions, all checklist items must be completed before passing 500 feet above the touchdown zone elevation.*

- *The use of a stabilized approach is mandatory because of its potential safety benefits.*

The Pilot Monitoring (PM) is responsible for the following call-outs during the approach:

- *Just before beginning the final approach segment, a callout should be provided to cross-check the altimeter settings and instrument indications and to confirm the status of warning flags for the flight and navigation instruments and other critical systems. During flight director or autocoupled approaches, proper flight director and/or autopilot mode engagement and lateral and/or vertical navigational signal tracking should be confirmed.*

- *If the flight altitude is less than 2,000 feet AGL, when the rate of descent exceeds 2,000 FPM. Additionally, a callout should be provided when the rate of descent exceeds 1,000 FPM if the flight altitude is less than 1,000 feet AGL.*

- *At 1,000 feet above the landing elevation to confirm aircraft configuration and to cross-check the flight and navigation instruments and confirm and set "missed approach altitude".*

- *For approaches conducted in IFR conditions, the PNF starting at 500 feet above minimums shall make call-outs of each 100 feet above minimums. At 200 feet above the MDA or DA(H) (as applicable) the PNF will state "going heads-up, looking for the runway environment". If the PNF will state "continue". Upon reaching minimums, the PF will execute the approach if the PNF does not get the runway environment in sight.*

- *At any point in the approach when the airspeed is below the planned speed for the existing aircraft configuration. If the aircraft has entered the final approach segment, a callout should also provide when the airspeed exceeds 10 knots above the planned final approach speed.*

- *If the approach becomes destabilized. The approach criteria for a stabilized approach" are not met and maintained.*

- *If the aircraft deviates from the proper approach profile during any portion of an instrument approach. That is:*

    - *If the aircraft has entered the final approach segment of an ILS/MLS approach and the localizer displacement exceeds 1/3 dot and/or the glideslope displacement is greater than one dot.*

    - *For localizer approaches if the displacement exceeds 1/3 dot during the final approach segment.*

    - *For VOR-based approaches if the displacement exceeds 2 degrees during the final approach segment.*

Note: There is no point in calling out a one dot LOC or G/S deviation if a correction is in progress to return back on course. Call-outs such as this would simply be redundant verbiage and, therefore, a distraction to the PF in a busy cockpit.

12.2 Stabilized Approach

Stabilized approach criteria for Aeromedevac, Inc. was defined and stated in their GOM (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.*

12.3 Circling and Contact Approaches

Aeromedevac was authorized to conduct circle-to-land approaches per the company Operations Specifications C075. Pilots were authorized to use the lowest IFR landing minimums for instrument approaches, which required a circle-to-land maneuver to the runway of intended landing, using the speed category appropriate to the highest speed used during the circle-to-land maneuver. Pilots were also required to complete an approved training program and a proficiency or the circle-to-land maneuver.

Aeromedevac's policy for circling and contact approaches was found in their GOM, (Section 13-5). Their policy stated the following:

First of all, the company must have an OPSPECS authorization to conduct circling or contact approaches. You, as PIC, are <u>not</u> authorized to conduct circling approaches when the weather is below 1000 and 3, unless you were trained in such a maneuver <u>and</u> have satisfactorily demonstrated such a maneuver to minimums, to an FAA inspector or company check airman, on a current 135.297 (IFR) check[38]

On a contact approach you are authorized to deviate from the prescribed instrument approach procedure (under IFR weather conditions) and to proceed visually to the runway of intended landing. Although the flight is still on an IFR flight plan, and ATC maintains responsibility for the separation of aircraft and wake vortex requirements, the flightcrew does assume total responsibility for navigation and terrain and obstacle avoidance.

Again, as in the case of circling approaches, formal company training is required for you, as PIC, to conduct a contact approach.

[38] FAR 135.297 Pilot in command: Instrument proficiency check requirements. (a) No certificate holder may use a pilot, nor may any person serve, as a pilot in command of an aircraft under IFR unless, since the beginning of the 6th calendar month before that service, that pilot has passed an instrument proficiency check under this section administered by the Administrator or an authorized check pilot. Sub paragraph B-G are omitted.

12.4 Sterile Cockpit

Title 14 *CFR* 135.100, "Flight crewmember duties," stated the following:

(a) No certificate holder shall require, nor may any flight crewmember perform, any duties during a critical phase of flight except those duties required for the safe operation of the aircraft. Duties such as company required calls made for such nonsafety related purposes as ordering galley supplies and confirming passenger connections, announcements made to passengers promoting their air carrier or pointing out sights of interest, and filling out company payroll and related records are not required for the safe operation of the aircraft.

(b) No flight crewmember may engage in, nor may any pilot in command permit, any activity during a critical phase of flight which could distract any flight crewmember from the performance of his or her duties or which could interfere in any way with the proper conduct of those duties. Activities such as eating meals, engaging in nonessential conversations within the cockpit and nonessential communications between the cabin and cockpit crews, and reading publications not related to the proper conduct of the flight are not required for the safe operation of the aircraft.

(c) For the purposes of this section, critical phases of flight includes all ground operations involving taxi, takeoff and landing, and all other flight operations conducted below 10,000 feet, except cruise flight.

The Aeromedevac GOM, (Section 13-7) stated the following:

Critical Phase of Flight (sterile cockpit)

No crewmember shall perform duties during a critical phase of flight, except those necessary for the safe operation of the aircraft .
Critical phase of flight is defined as:

- *All ground operations involving, taxi, takeoff and landing.*
- *All other operations below 10,000 feet MSL, except cruise flight.*

Note that taxi is defined as "movement of an airplane under its own power on the surface of an airport".

Eating, discussing personal matters, pointing out sights of interest to passengers, filling out company paperwork, reading publications not directly related to the conduct of flight and even ordering supplies or inquiring about passenger connections on company radio, etc. are clearly not permitted during critical phases of flight.

12.5 Preparing for an Approach at Night in VMC Conditions or when IMC Conditions Might be Encountered (Approach Briefing)

Aeromedevac, Inc. gives their pilots some background information on an NTSB recommendation to the FAA about approach briefings as outlined in their GOM (section 13-8). Aeromedevac states the following:

The NTSB made a recommendation to the FAA that flight crews conduct a full briefing for an instrument approach as a backup when a visual approach is planned in night VMC, or whenever IMC might be encountered. Clearly, in such conditions, if a visual approach must be abandoned, the additional approach preparation would provide a smooth transition to an instrument approach. In response to the above NTSB recommendation, the FAA has issued a bulletin that recommends the following:

> *Preparation should include having an open and readily available, most appropriate instrument approach chart. Clearly, if a precision approach is suitable, that would be the best choice.*
>
> *A briefing should be conducted that includes at least the following:*
> - *Frequency of the approach NAVAID.*
> - *Final approach course.*
> - *Glide slope (G/S) altitude at G/S intercept or the crossing altitude at the Final Approach Fix (FAF).*
> - *DH or MDA.*
> - *Missed approach point.*
> - *Initial heading and altitude for the missed approach.*

Navigation radios should be set on the appropriate frequency, identified, and the proper approach course set.

13.0 New Policy

In an Aeromedevac, Inc., all pilots meeting dated January 4, 2022, conducted by the Chief Pilot, the following new procedural changes were put into effect.[39]

1. Night VFR maneuvering minimums for KSEE: Captains may elect to maneuver VFR and land with periods of darkness when the reported ceilings are 2000' or greater and reported visibility is 5 sm. or greater. In the event that the weather is

[39] See attachment 7 for the actual letter to All Pilots.

not at or above these maneuvering minimums, the aircrew shall divert to a suitable alternate airport.
2. *CFR* 135.299 check rides for San Diego based pilots shall include a circle to land approach and landing on RWY 27R.
3. Captains Shall perform all circling approaches until further notice.
4. Aeromedevac is in the process of instituting a professionally produced Safety Management System. Details and briefing to follow soon.

Other topics discussed:

1. N55FJ (Lear 55) to be based out of SAN.
2. Special Qualification Airports – discussed adding to a list that will require special training and/or briefing using the SMS.
3. Suggested producing a charted pattern for VFR maneuvering for the SEE LOC-D
4. Discussed moving forward the iPad integration including manifest and Runway Analysis Data.
5. We discussed Aeromedevac's SOP's and adherence. SOP's to be sent to every PIC/SIC for review and briefing on this subject will be held on January 10, 2022.

14.0 NTSB Circling Safety Alert[40]

In March 2023, the NTSB put out Safety Alert 084, titled "Circling Approaches: Know the Risk!"

"Three fatal accidents involving Circling Approaches have happened between May 2017 and December 2021. Including the three-accident mentioned above, between 2008 and 2023, there have been 10 accidents involving Part 91 and Part 135 operators that occurred during a circling approach.[41] These accidents involved 17 fatalities."

On May 15, 2017, a Gates Learjet 35A, N452DA, operated by Trans-Pacific Jets, departed controlled flight while on a circling approach to runway 01 at the Teterboro Airport (TEB), Teterboro, New Jersey, and impacted a commercial building and parking lot. The Captain and FO died; no one on the ground was injured. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed.

[40] See Attachment 8 for the Safety Alert

[41] The event code used for these events is "approach – circling (IFR)". There may be other accidents that occurred during a visual flight rules (VFR) circling approach, such as NTSB case number WPR22FA068 described below, that are not captured in this data.

On July 26, 2021, about 1318 Pacific daylight time, a Bombardier Inc., CL-600-2B162 airplane, N605TR, was destroyed when it was involved in an accident near Truckee, California. The pilot, co-pilot and 4 passengers were fatally injured. The airplane was operated as a Title 14 *Code of federal regulations (CFR)* Part 91 personal flight. The flight departed its flight path south of the Truckee, airport while conducting a circling approach in day, VFR conditions.

On December 27, 2021, about 1914 pacific standard time, a Gates Learjet 35A, N880Z, departed controlled flight while on a circling approach to runway 27R at Gillespie field (SEE) El Cajon, CA, and impacted a residential street. The pilot-in-command and the second-in-command died as well as two nurses that were employed by the operator. No one on the ground was injured. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed.

With the three-circling approached mentioned above, the NTSB Safety Board felt strongly enough that a Safety Alert for circling approaches was warranted considering the accidents and fatalities.

15.0 FAA

At the time of the accident, FAA oversight of Aeromedevac was through the San Diego, (SAN), FSDO. The SAN FSDO has held the operating certificate ever since the inception of Aeromedevac, Inc. in 1992.

After the accident, the FAA looked at both pilots' history to see how many times they had been observed by the FAA. The FAA recorded the observation in the PTRS[42] database. The date base showed the captain had been observed three times in the past and the FO had been observed four time previously. All the FAA observation for the captain were checking, or training events and they were all graded satisfactory.

The captain, as an employee of Aeromedevac, had been observed by the FAA on:

- June 17, 2019, FAA Activity Code 1563[43]
- June 12, 2020, FAA Activity Code 1563
- June 13, 2020, FAA Activity Code 1563

The FO had been observed by the FAA four times with three of the observations coming as an employee of Aeromedevac, Inc. The August 30, 2006, training observation was in a PA-34 or Piper Seneca, and he was not in the employ of Aeromedevac at that time.

[42] Source FAA: Pilot Tracking and Reporting System
[43] Certification/Examiner Review

All the FAA observation for the FO were checking, or training events and they were all graded satisfactory.

- September 7, 2006, FAA Activity Code 1505/61[44]
- November 19, 2015, FAA Activity Code 1563
- November 20, 2017, FAA Activity Code 1563
- May 14, 2019, FAA Activity Code 1563

E. LIST OF ATTACHMENTS

Attachment 1	Director of Operations and Chief Pilot Transcripts
Attachment 2	FAA Transcripts
Attachment 3	Aeromedevac Flight Crew Personnel Transcripts
Attachment 4	Flight Safety International Personnel Transcripts
Attachment 5	Flight Crew Personnel and Training Records
Attachment 6	All Pilots Meeting Letter
Attachment 7	Circling Approach Safety Alert
Attachment 8	Fuel Slip

Submitted by:

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Captain Warren Abrams
Senior Air Safety Investigator

[44] Certificate/ Airman/ Added a Category or Class to his license. In this case, a Multi Engine Rating.

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