Aviation Investigation Final Report

Location:	Halloran Springs, California	**Accident Number:**	CEN24MA111
Date & Time:	February 9, 2024, 22:08 Local	**Registration:**	N130CZ
Aircraft:	Airbus Helicopters EC 130	**Aircraft Damage:**	Destroyed
Defining Event:	VFR encounter with IMC	**Injuries:**	6 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

In preparation for the Part 135 on-demand charter flight, there was no record that the pilot or safety pilot obtained a formal preflight weather briefing for the accident flight either directly from a flight services provider, through the ForeFlight application, or from a third-party vendor. No data were available to determine what weather information the pilots may have accessed using the ForeFlight application or some other source. The flight risk analysis (FRA) form the pilot completed about 4 1/2 hours before the accident flight's departure included risk items related to maintenance, weather, duty hours, and a second pilot. Based on the form's risk scoring criteria, the pilot's score of 12 for the accident flight was in the company's low risk category (the maximum score for the flight to remain in the low risk category was 15).

In the days preceding the accident, the helicopter had been undergoing routine maintenance that involved work on the radar altimeter, which was a required instrument for Part 135 flight operations. About 1727 on the day of the accident, the accident pilot and a company mechanic/pilot repositioned the helicopter from the maintenance facility to the company's flight operations base, and during the flight the accident pilot noted the radar altimeter was not functioning. During the return flight, the pilot texted the director of maintenance (DOM) about the issue. After arriving at the company's flight operations base, the pilot discussed the issue with the company flight follower (who was also the company's president). According to the flight follower, who also held operational control of the charter flight, during the discussions he told the pilot that the flight could not depart if the radar altimeter was not functioning. A company mechanic performed some troubleshooting on the radar altimeter; however, he was unable to rectify the issue and the radar altimeter remained non- functional. The mechanic reported that the pilots and the DOM were aware that the radar altimeter was not functioning, yet they departed at 1822 on the positioning flight to pick up the passengers.

About 40 minutes later, the positioning flight landed at the airport to pick up the charter passengers. After arrival, the pilot and flight follower had a phone conversation and exchanged text messages, but they did not discuss the status of the radar altimeter or weather conditions. The accident leg departure was delayed about 50 minutes due to a passenger's lost passport. A review of surveillance video at the fixed-based operator showed the pilots in the lobby using their cellphones; it is not known if the pilots checked the weather on their cellphones during that departure delay. In addition, the pilot did not complete an update to the FRA (which was internet accessible) while waiting at the airport. There was no evidence that the radar altimeter began functioning normally before the accident flight.

During the time between the pilot completing the FRA and the accident flight leg departure, the National Weather Service issued weather updates involving the planned flight route area. The updates included lower ceilings and precipitation with rain and snow showers across the region.

The accident flight departed in dark night visual flight rules (VFR) conditions and no moon illumination with a planned route to follow freeways to the destination airport. The freeway lights, vehicle lights, and various ground lights along the route of flight would have provided the light sources for VFR orientation. ADS-B and company flight tracking data showed the helicopter following the freeways at various altitudes and airspeeds toward the destination airport. About 10 miles west of the accident site, with mainly freeway vehicle lights available, the pilot began operating the helicopter at lower and slower airspeeds, deviated to the north of the freeway about 3,100 ft laterally, then returned back over the freeway. The lower altitude, slower airspeed, and deviation were likely due to encountering low ceilings and reduced visibility related to precipitation. Generally, helicopter pilots are trained to slow down and descend, if prudent, when negotiating or encountering deteriorating weather conditions. This can allow a pilot more time to safely maneuver the helicopter to avoid the conditions. The accident site area included hilly terrain that was rising on both sides of the freeway and in front of the helicopter.

About 2 minutes before the accident, the helicopter's airspeed and altitude increased, with a slight deviation to the south of the freeway. It is unclear if the pilot was attempting an inadvertent instrument meteorological conditions (IIMC) recovery maneuver. The helicopter continued the right turn for about 10 seconds when the helicopter began a rapid descent into terrain while maintaining the right turn. Witnesses, who were traveling in their vehicles, reported observing a fireball to the south of the freeway. The witnesses reported that the weather conditions in the area were not good as it was raining with a snow mix. Search and rescue efforts were difficult due to weather conditions that included low visibility, rain, snow, and high winds. The helicopter wreckage, which was highly fragmented and not survivable, was located about 1 hour and 40 minutes after the accident.

Postaccident examination of the airframe, engine, rotor blades, flight controls, rotor drive, main rotor, and fenestron components identified no evidence of preimpact malfunction or failure that would have precluded normal operation. The engine displayed rotational damage signatures and resolidified metal deposits consistent with powered operation at impact. All recovered instruments, avionics, and portable/personal electronic devices sustained damage that prevented data extraction. The helicopter wreckage was consistent with a high-energy, right-side-low attitude impact with terrain.

The accident pilot was trained that, to recover from entry into instrument meteorological conditions (IMC), he should first level the wings on the artificial horizon indicator, maintain heading, adjust torque and airspeed for best rate of climb, and climb to an altitude that will avoid obstacles. The gradual right turn, increased airspeed, and increased descent rate were inconsistent with the training to recover from entry into IMC. The pilot may have been susceptible to the Coriolis illusion when maintaining a constant turn if he moved his head, for example, to look from inside the cockpit to outside the cockpit. In addition, the helicopter also began to accelerate as it descended, which could have resulted in a somatogravic (false climb) illusion that led the pilot to believe the helicopter was climbing. The pilot likely experienced spatial disorientation while maneuvering the helicopter in IMC, which led to his loss of helicopter control and the resulting collision with terrain.

The accident occurred at 2208; while this time is not typically associated with extreme fatigue, it is a time when melatonin is increasing, and the body is preparing for sleep. Additionally, based on information from the pilot’s fiancée, the accident occurred during a time when the pilot would normally have been sleeping. Although the pilot had only been awake about 13 hours and on duty about 8 hours at the time of the accident, given the time of day and the body’s biological desire to sleep, the role of fatigue could not be ruled out. While the exact actions of the pilot before his spatial disorientation are unknown, fatigue has been shown to reduce one’s judgement, decrease reaction time, and degrade performance, all affecting the pilot’s ability to respond to deteriorating weather conditions.

Recognizing that opportunities exist to identify hazards or deficiencies before an accident occurs is a vital component of the safety management system (SMS). However, Orbic Air missed several opportunities to ensure that the flight met Federal Aviation Regulations (FAR) Part 135.160 and was being operated in a safe manner. Based on information from the company mechanic, after performing unsuccessful maintenance troubleshooting, the flight departed on the Part 91 positioning leg with an inoperative radar altimeter. Following the performed maintenance, the inoperative radar altimeter was not entered into the aircraft maintenance log as required by the company’s general operations manual (GOM) by either the pilot who identified the discrepancy or the mechanic who performed the work to rectify the discrepancy.

Company management (both the president and DOM) was aware of the radar altimeter’s status; however, they failed to exercise ground and flight operational control to cancel or modify the flight. In addition, the flight-follower had an opportunity to follow up with the pilot after the Part 91 positioning leg to ensure the radar altimeter was functioning, but neither the pilot nor flight follower readdressed the issue.

Postaccident review of the FRA completed by the pilot about 4 1/2 hours before the accident flight showed concerns of accuracy related to risk items involving maintenance, weather, second pilot, and duty hours. Providing some leniency in the interpretation of the second pilot and borderline duty hours after experiencing the delay, a minimum rating of 18 should have been assigned to the flight, indicating an elevated risk that required a discussion with management and consideration of risk mitigation strategies. There was no evidence the pilot updated the FRA after his initial assessment.

Probable Cause and Findings

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

The pilot's decision to continue the visual flight rules flight into instrument meteorological conditions, which resulted in the pilot's spatial disorientation and loss of control. Contributing to the accident was the company's inadequate oversight of its safety management processes, including ensuring the pilots were accurately completing and updating the flight risk analysis, logging maintenance discrepancies, and ensuring the helicopter met Part 135 regulations before departure.

Findings

Personnel issues	Decision making/judgment - Pilot
Personnel issues	Spatial disorientation - Pilot
Personnel issues	Aircraft control - Pilot
Organizational issues	Adequacy of safety program - Operator
Environmental issues	Low visibility - Decision related to condition
Aircraft	Data recorders (flight/maint) - Not installed/available

Factual Information

History of Flight

Enroute	VFR encounter with IMC (Defining event)
Enroute	Loss of control in flight
Enroute	Collision with terr/obj (non-CFIT)

On February 9, 2024, about 2208 Pacific standard time, an Airbus Helicopters EC 130B4 helicopter, N130CZ, was destroyed when it was involved in an accident near Halloran Springs, California. The two pilots and four passengers were fatally injured. The helicopter was operated by Orbic Air, LLC, as a Title 14 *Code of Federal Regulations (CFR)* Part 135 on-demand flight.

According to company records, in the days preceding the accident, Orbic Air coordinated two charter flights with a broker. As per the agreement, Orbic Air would conduct a charter flight to transport passengers from the Palm Springs International Airport (PSP), Palm Springs, California, to the Boulder City Municipal Airport (BVU), Boulder City, Nevada. Three days later, Orbic Air would conduct a charter flight to pick up the passengers from BVU and fly them back to PSP. During the agreement discussions, the broker initially requested a twin-engine aircraft with an instrument-rated pilot; however, Orbic Air's capability was limited to a single-engine aircraft and VFR operations. According to Orbic Air's flight operations employee, during the broker discussions, he mentioned to the broker the addition of a second pilot for the nighttime flights, which was a standard company precaution for flights to Las Vegas, Nevada, due to the route and timing considerations. The charter flights were confirmed with the broker on February 8th.

At 1405 on the day of the accident, the pilot and another company pilot/mechanic traveled by train to the Camarillo Airport (CMA), Camarillo, California, to pick up the helicopter from their maintenance base. According to the DOM, about a week and a half before the accident, the helicopter had been placed into their maintenance facility for maintenance that included an installation of a Garmin GTN 650 navigator avionics device and repair to the radar altimeter. The maintenance had been completed, and on February 9th the DOM conducted a test flight, which started about 1615, lasted about 4 minutes, and consisted of one traffic pattern at CMA. The DOM placed an entry into the maintenance logbook that there were no deficiencies noted.

An FRA form was completed by the pilot at 1613 for the Part 135 leg of the planned flight. The Part 135 leg was scheduled from PSP to BVU, and all other legs were operated under Part 91. The pilot's FRA total trip score was 12, indicating a low-risk flight (a score above 15 would indicate an elevated risk and require review by management and risk mitigation, and a score above 20 would be a possible no-go for the flight).

At 1727, the pilot and company pilot/mechanic departed CMA and arrived at Bob Hope Airport (BUR), Burbank, California, at 1743, which was Orbic Air's flight operations base. During the flight, the accident pilot texted the DOM to report that the radar altimeter was inoperative. After arrival at BUR, the company pilot/mechanic attempted to troubleshoot and fix the radar altimeter via multiple phone communications with the DOM, who was located at CMA. Following the phone calls, the DOM was unsure if the radar altimeter was fixed and operative. The DOM reported that during the discussion, he told the company mechanic to bring the helicopter back to CMA. The company mechanic reported that the two accident pilots (pilot-in-command [PIC] and safety pilot) were in a hurry to depart so the mechanic did some "small troubleshooting." The mechanic could not rectify the issue, so he packed up his tools and the helicopter departed to PSP. The mechanic had no further contact with the pilots.

According to the company flight follower for the charter flight, who was also Orbic Air's president, after arriving at BUR, the accident pilot told him they were having issues with the radar altimeter. The flight follower reported that he explained to the pilot, "if it's working, I think you're okay, but if it's not working, don't take the flight." The flight follower also had discussions about the weather for the entire planned flight with the pilot and safety pilot. According to the flight follower, neither he, the pilot, or the safety pilot had any concerns about adverse weather along the planned route of flight to BVU.

According to ADS-B data, at 1822, the helicopter departed BUR to PSP, and the flight follower did not know the status of the radar altimeter at the time of departure. At 1907, after the helicopter arrived at PSP, the flight follower had a phone conversation and exchanged text messages with the pilot, but neither discussed the status of the radar altimeter during the conversation. Surveillance video at the fixed-based operator showed the pilots in the lobby for about 50 minutes using their cellphones while waiting for the passengers as one passenger had misplaced their passport. It was not known if the pilots checked the weather on their cellphones during that time, and there was no evidence the pilot updated the FRA form.

After refueling with 41 gallons of fuel, the Part 135 flight departed PSP at 2045 under night VFR and flew a northwesterly heading for about 2 miles before following US Highway 111 to Interstate (I-)10 at altitudes varying between 2,500 and 3,000 ft above mean sea level (msl). The helicopter continued along I-10, crossed over San Bernadino International Airport, San Bernadino, California, and then followed I-215 to I-15.

The helicopter followed I-15 toward the planned destination of BVU. After passing east of the Cajon Pass, the altitude of the helicopter varied between about 3,300 and 5,500 ft msl, and the ground speed varied between about 93 knots (kts) and 155 kts but maintained between 130 and140 kts for most of the time. About 2146, ADS-B data was lost while the helicopter was about 24 miles east of Barstow, California, which was likely due to lower altitudes and terrain interference. The ADS-B lost data gap was about 47.5 miles long, and ADS-B data resumed about 2206 near the Halloran Springs/I-15 freeway exit west of the accident location. The last ADS-B data points for the flight tracked east-southeast, gradually descended in altitude, and then increased in a rapid descent and airspeed (see figures 1 and 2). The accident site was located 0.31 miles east-southeast of the last ADS-B data point at an elevation of about 3,360 ft msl.

Figure 1. Overhead view of ADS-B accident flight track.

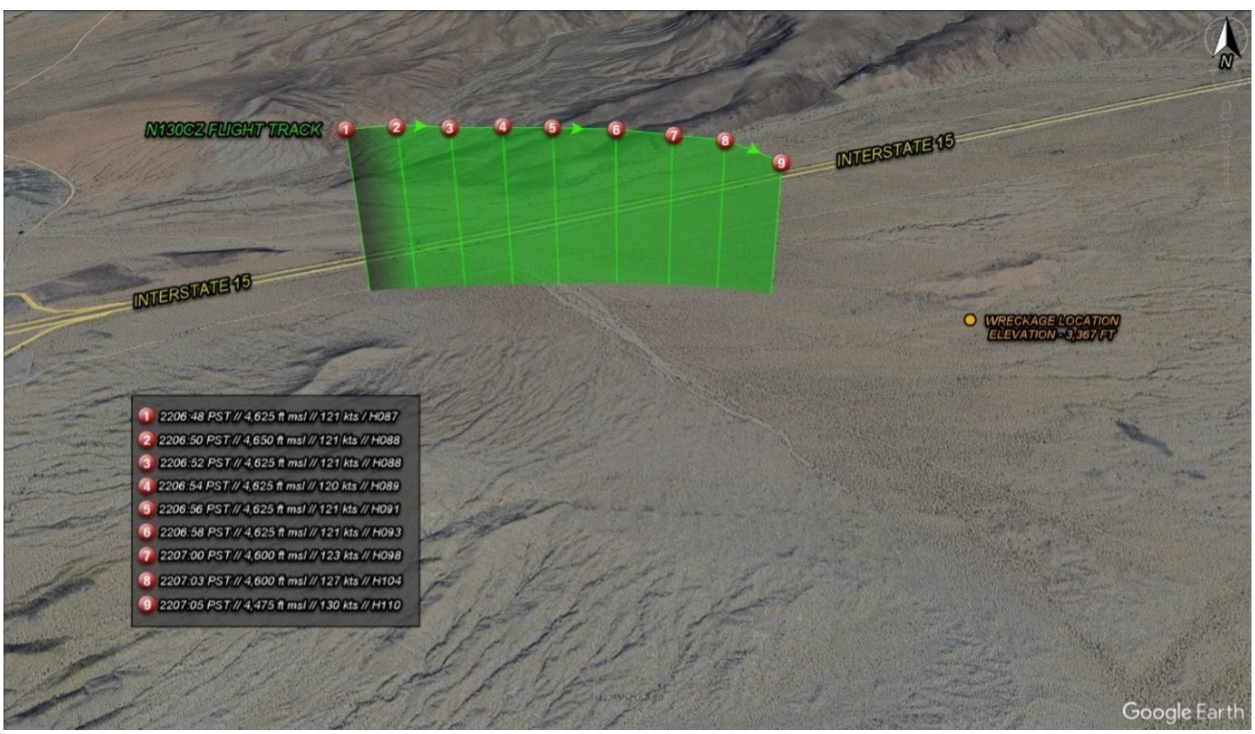

Figure 2. Final segment of flight track data with time, altitude (msl), ground speed, and heading information.

The helicopter was equipped with SpiderTracks GPS technology tracking software that captured most of the flight, except for the last several seconds. SpiderTracks data was consistent with the ADS-B data and included the area of the ADS-B lost data gap. According to SpiderTracks data, while the helicopter was in the ADS-B lost data gap it continued to follow I-15 from altitudes that ranged from about 4,850 ft msl to about 2,199 ft msl (about 1,172 ft above ground level [agl]). About 2200, when the helicopter was near Baker, California, the pilot began to slow the helicopter's airspeed from 130 to 140 kts, down to a low of 90 kts, and then maintained airspeed below 120 kts until the descending right turn. The data showed that after the helicopter passed Baker, it turned left (north) and deviated away from its course over I-15 by a lateral distance of about 3,100 ft, before returning over I-15 and continuing until the SpiderTracks data ended.

According to law enforcement, several witnesses who were traveling in vehicles on I-15 called 911 to report observing a "fireball" to the south of I-15. The witnesses reported the weather conditions in the area were not good as it was raining with a snow mix. The accident site was located by law enforcement at 2346.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	25,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	Helicopter; Instrument helicopter	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	December 27, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 24, 2023
Flight Time:	(Estimated) 1997.3 hours (Total, all aircraft), 46.2 hours (Total, this make and model), 1902.8 hours (Pilot In Command, all aircraft), 109.2 hours (Last 90 days, all aircraft), 39.8 hours (Last 30 days, all aircraft), 2.5 hours (Last 24 hours, all aircraft)		

Other flight crew Information

Certificate:	Commercial; Flight instructor	**Age:**	22,Male
Airplane Rating(s):	None	**Seat Occupied:**	Center
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	Helicopter; Instrument helicopter	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	July 19, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	May 17, 2023
Flight Time:	500.4 hours (Total, all aircraft), 124.4 hours (Last 90 days, all aircraft), 44.5 hours (Last 30 days, all aircraft), 2.2 hours (Last 24 hours, all aircraft)		

Orbic Air hired the pilot in 2021, and he completed his initial competency check in accordance with 14 *CFR* Part 135.293 (which specifies initial and recurrent pilot testing requirements) on September 8, 2022, in the Robinson R-44 helicopter.

According to the pilot's resume, dated April 4, 2023, the pilot had about 6.2 hours of turbine flight time; 117 hours of instrument time, which included 69.4 hours in simulators; 48.8 hours while flying under simulated IMC; and 0 hours in actual IMC.

The pilot completed his initial competency check in accordance with 14 *CFR* Part 135.293 in the accident helicopter on July 10, 2023. The check included demonstrating satisfactory flying maneuvers required for IIMC to VFR conditions and unusual attitude recovery.

According to the pilot's fiancée, in the days preceding the accident, he woke up between 0500 and 0630 and went to bed around 2000 and 2030. On the morning of the accident, the pilot woke up at 0620 and went back to bed from about 0730 to 0900 before resuming his activities.

Orbic Air hired the safety pilot in 2022, and he completed his initial competency check in accordance with 14 *CFR* Part 135.293 in the Robinson R-44 helicopter on May 17, 2023. The check included demonstrating satisfactory flying maneuvers required for IIMC recovery and unusual attitude recovery. The safety pilot was assigned to operate as a Part 135 PIC in the Robinson R-44 helicopter.

Aircraft and Owner/Operator Information

Aircraft Make:	Airbus Helicopters	**Registration:**	N130CZ
Model/Series:	EC 130	**Aircraft Category:**	Helicopter
Year of Manufacture:	2006	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	4060
Landing Gear Type:	None; Skid	**Seats:**	7
Date/Type of Last Inspection:	February 9, 2024 Continuous airworthiness	**Certified Max Gross Wt.:**	5351 lbs
Time Since Last Inspection:		**Engines:**	1 Turbo shaft
Airframe Total Time:	4778.8 Hrs as of last inspection	**Engine Manufacturer:**	Turbomeca
ELT:	Not installed	**Engine Model/Series:**	Arriel 2B1
Registered Owner:	ORBIC AIR LLC	**Rated Power:**	
Operator:	ORBIC AIR LLC	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	1OBA

Accident Helicopter Information

The helicopter, was manufactured in 2006 by Airbus Helicopters (previously Eurocopter) (see figure 3), and Orbic Air purchased the helicopter on March 16, 2022.

FAA airworthiness documents showed equipment changes from the original manufactured configuration that included, but were not limited to,: the Bendix King KR87 automatic direction finder (ADF) system had been removed and a FreeFlight TRA3500 radar altimeter had been installed.

Figure 3. Undated photograph of the accident helicopter (Source: Internet).

Maintenance and Radar Altimeter Information

The maintenance records showed four radar altimeter issues between June 2022 and the accident flight. The following maintenance entry was noted for February 9, 2024:

> Main rotor (MR) pin inspection, 7-day/10-hour inspection, MR pitch rod Airworthiness Directive, Engine 300-hour inspection, Radar Altimeter (RadAlt) repair (repaired coax, reinstalled antennas), Unibal repair, Instrument lights inoperative and repaired, Oil cooler leak repair, Removed GNS 430 and installed GTN650Xi, Removed GTX300 and installed GTX 345. Ground run and test flight completed.

According to the DOM, the radar altimeter exhibited intermitted issues depending on the power sequence to the unit. In some instances, if the radar altimeter was turned on with just battery power, the radar altimeter would "flash at you and then sort of…it would nuke it." In other instances, if the radar altimeter was turned on while the helicopter engine and generator were running and supplying constant voltage, the unit would typically function without an issue. As a result, the DOM then instructed the company pilots to leave the radar altimeter off during the start sequence and turn it on when the generator had come online to 28 volts.

Equipment Discrepancy Reporting and Records

The aluminum document storage clipboard that contained helicopter and maintenance information onboard the helicopter was located intact in the wreckage debris area. A catalog of the contents was as follows: 1) flight log, 2) recurring maintenance compliance log, 3) dual control removal/installation log, and 4) aircraft status report (created January 11, 2024). Not present in the clipboard was an aircraft discrepancy log.

The DOM stated that if there was an aircraft discrepancy identified by the flight crew that it would be reported via text message or phone call by the pilot to the DOM. The DOM would then instruct the flight crew how to proceed. There was no written (paper) record kept of these discrepancies. If the discrepancy required maintenance action, the maintenance department would make the repair and enter it into the internet-based tracking system. Recent maintenance would be included in the aircraft status sheet that goes into the aircraft clipboard. Typically, the pilots did not review the maintenance records before accepting an aircraft for flight. If there was any recent maintenance performed, the DOM would convey the work done to the pilot verbally.

The Orbic Air GOM (Revision 11), Section F, Chapter 6, stated that when a pilot found a defective piece of equipment they should:

> Check the Aircraft Discrepancy Log in the aircraft and see if the item has been previously reported and properly deferred. If the item has not been previously written up, the PIC will record the pertinent information on the company Aircraft Discrepancy Record. The Aircraft Discrepancy Log will remain in the aircraft until the affected part is repaired or replaced and an entry to that effect is made in the aircraft permanent maintenance records.

Title 14 *CFR* Part 135.65, Reporting mechanical irregularities, states that:

> Each certificate holder shall provide an aircraft maintenance log to be carried on board each aircraft for recording or deferring mechanical irregularities and their correction.
>
> The pilot in command shall enter or have entered in the aircraft maintenance log each mechanical irregularity that comes to the pilot's attention during flight time. Before each flight, the pilot in command shall, if the pilot does not already know, determine the status of each irregularity entered in the maintenance log at the end of the preceding flight.
>
> Each person who takes corrective action or defers action concerning a reported or observed failure or malfunction of an airframe, powerplant, propeller, rotor, or applicable, shall record the action taken in the aircraft maintenance log under the applicable maintenance requirements of this chapter.
>
> Each certificate holder shall establish a procedure for keeping copies of the aircraft maintenance log required by this section in the aircraft for access by appropriate personnel and shall include that procedure in the manual required by Sec. 135.21.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	KBYS,2350 ft msl	**Distance from Accident Site:**	38 Nautical Miles
Observation Time:	21:55 Local	**Direction from Accident Site:**	260°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Overcast / 5500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	210°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.91 inches Hg	**Temperature/Dew Point:**	7°C / 0°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Palm Springs, CA (PSP)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Boulder City, NV (BVU)	**Type of Clearance:**	None
Departure Time:	20:45 Local	**Type of Airspace:**	Class G

A postaccident search of weather services and commercial applications possibly used by the pilot or safety pilot for a weather briefing or flight plan produced no records. The pilot was reported to use the ForeFlight application for his planning and flight activities.

The National Weather Service's (NWS) Las Vegas weather forecast office issued an Area Forecast Discussion (AFD) at 1402 that was applicable for a region that included the accident location. The forecast synopsis included a weather disturbance with scattered rain and snow showers.

At 1904, the AFD issued an update that included ceilings of 4,000 to 5,000 ft msl and scattered rain showers across the region, with snow showers near the 4,000 ft msl level.

The closest NWS Terminal Aerodrome Forecast (TAF) site to BVU was Henderson Executive Airport (HND), Las Vegas, Nevada, which was located 14 miles west of BVU and 50 miles northeast of the accident site. At 1520, a TAF was issued for HND that forecasted for the accident time: a wind from 190° at 7 knots, visibility greater than 6 statute miles, light rain showers, scattered clouds at 3,500 agl and ceiling overcast at 5,000 ft agl. At 2136, the TAF reported moderate rain showers in the vicinity, scattered clouds at 5,000 ft agl, and ceiling overcast at 9,000 ft agl.

A Graphical-Airmen's Meteorological Information (G-AIRMET) was issued about 1300 and valid for the accident location at 2200, which reported moderate icing from the freezing level (about 5,300 ft) to 16,000 ft. There were G-AIRMETs for IFR and mountain obscuration conditions that were issued at 1300 and valid for 2200 in the accident region, but their boundaries were north of the accident site and covered areas closer to Las Vegas and were not valid for the area between the accident location at BVU.

At 2155, the Bicycle Lake Army Airfield, located about 38 miles west of the accident site at an elevation of 2,350 ft, reported a wind from 210° at 7 knots, visibility of 10 statute miles or greater, ceiling overcast at 5,500 ft agl, temperature 7°C, dew point of 0°C, and altimeter setting of 29.91 inches of mercury.

At 2156, an Automated Weather Observing Station (AWOS) at HND reported a wind from 250° at 4 knots, visibility of 10 statute miles or greater, ceiling broken at 9,000 ft agl, overcast clouds at 11,000 ft agl, temperature 6°C, dew point of 2°C, and altimeter setting of 29.94 inches of mercury.

At 2150, an Automated Surface Observation Station (ASOS) at Barstow-Daggett Airport (DAG), Daggett, California, located about 55 miles southwest of the accident site at an elevation of 1,930 ft, reported a wind from 250° at 15 knots, visibility of 10 statute miles or greater, clear skies, temperature 7°C, dew point -1°C, and altimeter setting of 29.96 inches of mercury.

Meteorological reporting station CF140 was located about 13 miles southwest of the accident site at an elevation of 950 ft. Wind and temperature parameters reported at CF140 during the times surrounding the accident time included the following information in table 1.

Table 1. Wind, temperature and weather conditions reported by CF140.

Time	Temp	D_Temp	RH	W_Mag	W_Dir	G_Mag	WX
2100	9.9°	5.0°	72	3.7	070°	4.1	---
2115	9.7°	5.2°	74	3.9	083°	4.3	---
2130	9.9°	4.6°	70	3.7	079°	4.3	---
2145	9.4°	5.3°	76	2.3	219°	3.7	---
2200	9.1°	5.8°	80	4.1	302°	7.2	light rain
2215	8.1°	5.2°	82	9.5	317°	11.5	light rain
2230	8.1°	4.8°	80	9.7	347°	10.5	light rain
2245	7.8°	4.7°	81	7.4	003°	9.1	light rain

Note: Temp = temperature (C); D_Temp = dew point temperature (C); RH = relative humidity (percent); W_Mag = average wind magnitude (knots); W_Dir = average wind direction (true); G_Mag = gust wind magnitude (knots); WX = present weather.

WSR-88D Level-II base reflectivity weather radar imagery from the Las Vegas site, located about 52 miles east-northeast of the accident site with an antenna elevation of 4,950 ft, is shown in figures 4 and 5. Based on standard refraction and beam width, the site would have seen altitudes above the accident location between 6,800 and 12,000 ft.

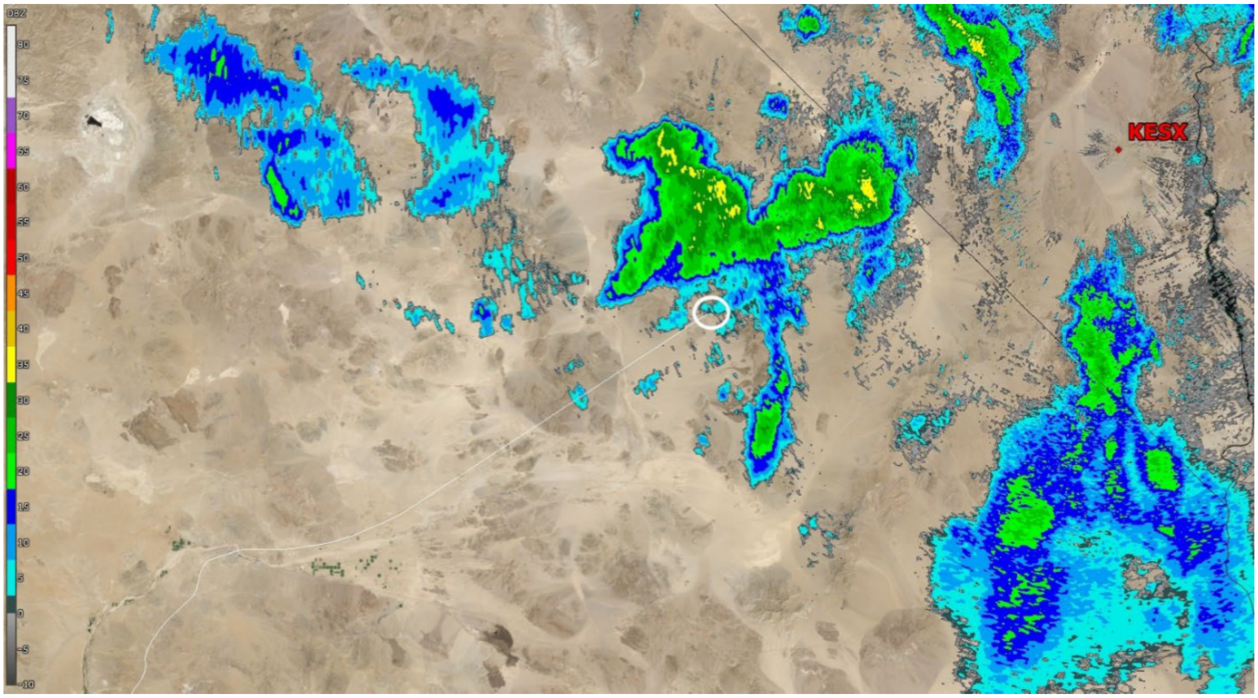

Figure 4. “Smoothed” base reflectivity product from a sweep initiated at 2206:05. The accident helicopter’s flight track is marked by the thin white line and the accident location is denoted by the white circle.

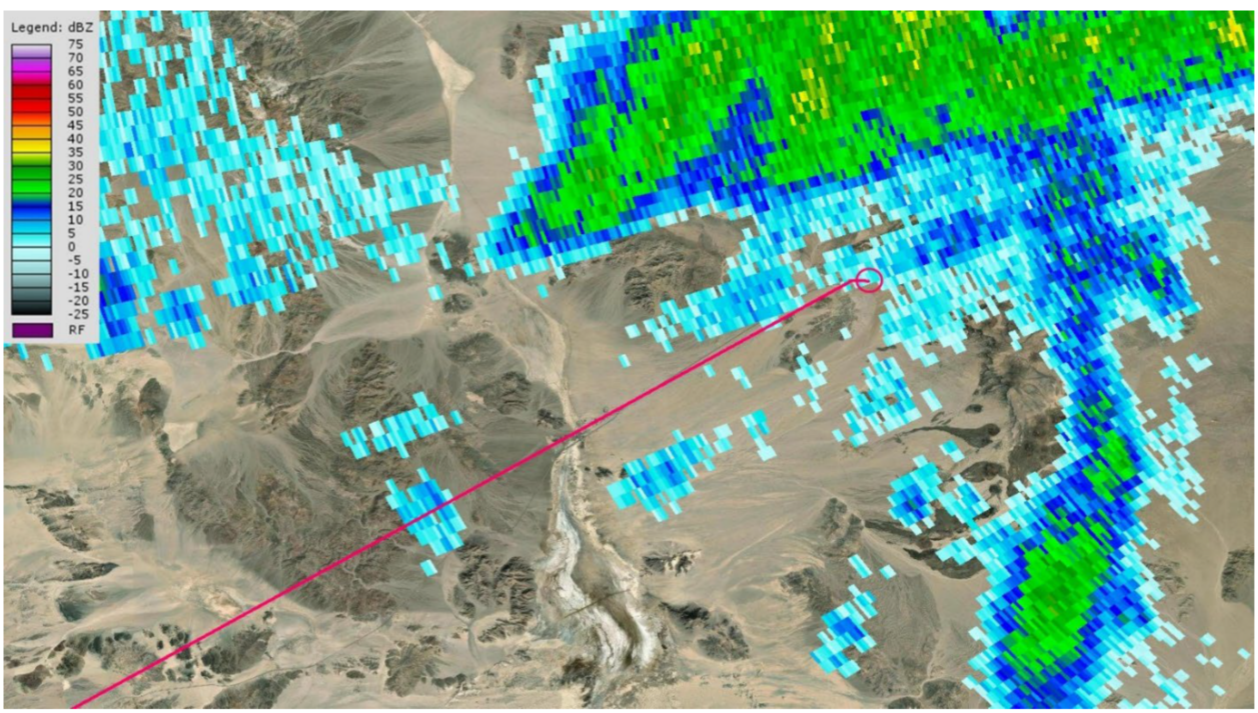

Figure 5. Unsmoothed base reflectivity product from a sweep initiated at 2206:05. The accident helicopter's flight track is marked by the red line and the accident location is denoted by the red circle.

A High-Resolution Rapid Refresh model sounding for near the accident site at 2200 was obtained from the National Oceanic and Atmospheric Administration's Air Resource Laboratory and analyzed by the RAwinsonde OBservation (RAOB) program. Broken or overcast clouds were identified from about 9,500 ft through 15,000 ft, and the freezing level was about 5,300 ft. RAOB identified the potential for light clear or rime icing between about 5,900 ft and 8,300 ft.

According to local law enforcement, several witnesses who called 911 and were traveling in vehicles on I-15 reported the weather conditions in the area were not good, as it was raining with a snow mix. Officers responding to the accident site reported that weather conditions included low visibility due to snow, ice, high winds, rain, and a temperature of about 35° F. The San Bernardino Sheriff's Department air unit was unable to respond due to "dangerous flying conditions."

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	4 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:		**Aircraft Explosion:**	On-ground
Total Injuries:	6 Fatal	**Latitude, Longitude:**	35.37304,-115.86357

The wreckage was located at an elevation of about 3,360 ft in high mountainous desert and scrub-brush-covered terrain, and debris were scattered about 300 ft along a 120° magnetic heading from the initial impact point (see figures 6 and 7).

Figure 6. Overhead view of the accident site and wreckage distribution.

Figure 7. Overhead view of the initial impact area.

The initial impact point, which was a 1.5-ft-deep, 12-ft-long and 10-ft-wide ground crater, contained portions of the right landing gear skid, right skid step, cockpit wiring, and cabin floor structure. The right skid step protruded upward at a 45° angle at the most eastern edge of the ground crater (see figure 8). Immediately to the right of the crater was a ground divot consistent in the size and shape of the rotor head, with 2 main rotor blade impact marks extending from the divot.

Figure 8. Initial impact ground crater and debris field.

All major helicopter components were identified at the accident site. The fuselage was highly fragmented, and the cockpit and cabin were destroyed. All seven seats had separated from the structure and were fragmented and distributed about the debris field. The pilot’s collective twist grip was in the FLIGHT position, and the co-pilot’s cyclic and collective were not located in the debris field.

The aft section of the fuselage (center fuel tank area) and the forward tail boom section displayed fire damage, was coated with soot, and exhibited crushing signatures favoring the right side. The flight control tubes and linkages leading up to the flight control servos were fragmented and continuity could not be verified. All three pitch control links were attached at the swashplate and blade pitch change horns. The main rotor blades were fragmented and broomstrawed, and the blade sleeves and tips were present (see Figure 9).

Figure 9. Rotor mast and rotor head.

The fenestron tail section, with the tail fin and horizontal stabilizer separated from the forward part of the tail boom. All the fenestron blades remained in their hubs and the blade tips displayed chordwise scratches (see Figure 10).

Figure 10. Tail fin and fenestron.

Postaccident examination of the airframe, engine, rotor blades, flight controls, rotor drive, main rotor, and fenestron components identified no evidence of preimpact malfunction or failure that would have precluded normal operation. The engine displayed rotational damage signatures and resolidified metal deposits consistent with powered operation at impact.

Postaccident examination of the recovered instruments, avionics, and engine controls revealed substantial impact or fire damage (or both) to most of the components. A radar altimeter avionics box, vehicle engine multifunction display, and digital engine control unit were identified, all of which showed significant impact and fire damage, and were unable to be tested; data extraction was not possible.

Several personal electronic devices were recovered from the accident site and sent to the National Transportation Safety Board's Vehicle Recorders Laboratory for examination and data extraction. Due to impact and thermal damage, no data was recovered from the devices.

Flight recorders

The helicopter was not equipped with a flight recorder (see Additional Information).

Medical and Pathological Information

The pilot and safety pilot reported no medical conditions on their most recent FAA airman medical applications. The FAA Forensic Sciences Laboratory performed toxicology testing on postmortem specimens. The results were negative for ethanol and all tested-for substances. The San Bernardino County Sheriff's Department Coroner Division, San Bernardino, California, performed autopsies on the pilot and safety pilot. The pilots' causes of death were multiple blunt force injuries.

Organizational and Management Information

Orbic Air is a privately owned company with a Part 135 rotorcraft on-demand operations certificate that was issued on April 21, 2022. The company's main office was located at BUR and provided the pilots a private place to conduct business. The company employed 15 employees, which included 3 pilots.

FAA oversight of Orbic Air's certificate was performed by the Van Nuys Flight Standards District Office. The FAA authorized Orbic Air to conduct day/night, VFR-only passenger flights in the EC 130B4 and R-44 helicopters listed in the FAA-approved Operations Specifications (OpsSpecs). The company had one AS350-B3 helicopter, one EC 130B4 helicopter, one R-22 helicopter and four R-44 helicopters.

Company management consisted of a president, director of operations (DO), chief pilot, safety manager, quality manager, and DOM.

Company Operational Control

Operational control was detailed in the company's OpsSpecs and GOM. The company president, DO, and chief pilot were listed in the GOM as having operational control of flight operations. The DOM had ground operational control with respect to the maintenance of the aircraft and no operational control with flight operations.

Company Flight Follower

A records review revealed that the Orbic Air president received the required training to perform the flight follower duties and acted as the flight follower for the accident flight.

According to the GOM, Section A, the flight follower duties and responsibilities were stated, in part,

"Flight followers are employees of ORBIC AIR, LLC. Flight followers will have the responsibility of Operational Control. To perform the functions of flight follower, he/she shall be qualified and trained before accepting this responsibility. Therefore, all flight followers must complete the company flight follower training course. ORBIC AIR, LLC shall maintain current records for each flight follower, which shows compliance with Federal Aviation Regulations (FARs) relating to proficiency and required training."

A. No aircraft will be released unless it is in airworthy condition. However, an aircraft may be released with inoperative or missing components in accordance with the Minimum Equipment List.

C. The flight follower is responsible for solutions to operational problems, caused by cancellations, delays, diversions, and mechanical interruptions.

G. All aircraft departing a station for the purpose of revenue flight, must be authorized by an approved flight follower.

I. No flight may depart unless both the pilot in command (PIC) and the flight follower are thoroughly familiar with the reported and forecast weather and considering all factors and conditions. The flight follower will notify the pilot which flight legs are Part 135 using the Flight Release form. The PIC will review the following information immediately prior to each flight:

1) All available weather reports and forecasts or subsequent changes thereto affecting the proposed flight.
3) All SIGMETS or convective SIGMETSs affecting the proposed route of flight.
4) Advisories of all anticipated adverse changes in the weather phenomena affecting the proposed flight.
5) All inoperative or missing components on the aircraft to be flown and any restrictions that may apply in accordance with (IAW) the MEL.
9) Forecasts or reported icing conditions that exist, including the intensity thereof."

Company Operations Specifications and Radar Altimeter

The company OpsSpecs stated in part, *"The certificate holder is not authorized and shall not: Reference paragraph A160, conduct Part 135 rotorcraft operations without the radio altimeter* *equipment required by 14 CFR Part 135.160(a), under a deviation as provided in §135.160(b) and in accordance with the limitations and provisions of LODA A160."*

The company OpsSpecs, Paragraph D095, authorized the company to use an FAA-approved Minimum Equipment List (MEL); however, Paragraph D095 only listed the R-44-II as being authorized to use an FAA-approved MEL. According to the DO, the company had applied for an MEL for the accident helicopter and were waiting on final approval from the FAA.

The Master Minimum Equipment List (MMEL) for the Airbus Helicopters EC 130B4, stated in part:

"3444-01 Radio Altimeter System. (O) Procedures for the crew to ensure alternate procedures are established and used, night operations is not performed with NVG's; no night off-airport landings or landings at un-improved areas; for flight at night, the pilot must evaluate terrain and obstacles along the route and fly at such an altitude so as to ensure all terrain and obstacles along the route of flight are cleared vertically by no less than 500 feet; flight at night is not conducted over water or terrain without surface lights, and pilot is aware of potential degraded AP performance on ILS/GS or LPV vertical."

Company Safety Pilot

According to company personnel, the safety pilot's duty aboard the accident helicopter was to act as an extra set of eyes, assist with traffic avoidance, navigation, and radio operations. The safety pilot was not permitted to manipulate the flight controls during Part 135 operations. The DO reported that there are two situations when a safety pilot or a second pilot is used; the first is when the customer requests, and the second was, "in most cases [Orbic Air] do that on our own, depending on the flight, and this [accident flight] was one of them." The DO indicated that during night desert flights, they would use a safety pilot. The safety pilot was not documented in the OpsSpecs, GOM, or training manual.

Company Weather Requirements

The GOM stated that all flights were to be accomplished in accordance with Federal regulations, company OpsSpecs, and policies and procedures set forth in the GOM. Per the GOM, no pilot was to operate a helicopter under VFR in Class G airspace, or within the lateral boundaries of the surface area of Class B, Class C, Class D, or Class E airspace designated for an airport unless visibility was at least 1 mile at night. For charter flights, the ceiling minimum was 500 ft and 2 miles visibility. In addition, no pilot was to operate a helicopter unless that person had visual surface reference or, at night, visual surface light reference, sufficient to safely control the helicopter.

Mission Planning

Orbic Air used a vendor software for mission planning, which included an FRA feature. According to the DO, the pilot needed three things before departing on a flight: the load manifest, the flight risk assessment, and the weight and balance.

Recovering from an Unusual Attitude an Inadvertent Encounter with Instrument Meteorological Conditions

According to the Orbic Air Instructor Training Guide and GOM, the emergency maneuvers section contained information for conducting unusual attitude recovery and IIMC procedures. The unusual attitude recovery involved, as soon as an unusual attitude is detected, a recovery made to straight-and-level flight. After positive control of the aircraft was assured, the original heading and altitude should have been established. To recover from an unusual attitude, correct bank and pitch attitude, and adjust power and pedals to trim the aircraft as necessary.

The IIMC recovery procedure involved the following corrective actions, in part; level the wings on the attitude indicator, maintain aircraft heading, turning only to avoid known obstacles, adjust torque to applicable climb power, and adjust airspeed to climb airspeed.

Safety Management System

Orbic Air had a SMS that was neither required by the FAA nor part of the company's FAA-approved or -accepted programs. Orbic Air developed its SMS in January 2023 with the assistance of a vendor using both FAA and international guidance. The provisions for the SMS and its training curriculum were outlined in the company's SMS Manual, which was neither FAA-accepted nor -approved (nor was it required to be). According to the SMS Manual, the company president was designated as the accountable executive who had ultimate responsibility for safety and maintaining the SMS.

According to the SMS Manual, the structure of the SMS included safety policy, safety risk management, safety assurance, and safety promotion. Safety policy included the guidance set out in the SMS Manual; safety risk management involved hazard identification and risk assessment and mitigation; safety assurance involved continuous monitoring, internal evaluation, corrective action, and safety performance measurement; and safety promotion included training and communication of safety objectives. The manual provided the SMS building blocks; Orbic Air was to establish processes and procedures to have an effective SMS.

The SMS vendor provided computer-based, internet-accessible training and a variety of other tools (such as internet-accessible forms and templates) to support the company's SMS functions.

Flight Risk Analysis

The FRA form was an SMS tool company pilots used to document any risks and associated mitigations for a flight, including weather, mission-specific issues, equipment, and pilot health and fatigue considerations. The accident pilot used the FRA form (which was internet accessible) from the SMS program to generate an FRA for the accident flight.

Once completed, the FRA provided a total score for the flight based on the pilot's selected risks and mitigations. The form used numeric thresholds for determining low, elevated, and high risk scores, with the latter two requiring additional levels of evaluation (and automatically generating e-mail notifications to management) before the pilot could proceed. According to the safety manager, the FRA was a requirement for all Part 135 flights, and if management saw a high risk for a Part 91 flight, they will direct the pilot to complete an FRA for that leg.

When asked about the return flight from BVU to BUR, the safety manager indicated that it would have been a high-risk flight (night over the desert) and the pilot would have done a new FRA for that flight before departure (using a personal electronic device). The DO also reported that the FRA was required for all Part 135 flights and not for Part 91.

The safety manager explained that the FRA values for the accident flight did not rise to the level termed "elevated." Had the FRA values become elevated, an email was automatically sent to management as an alert that would then have required risk mitigation.

Safety Assurance Functions and Audits

Per the SMS Manual, the intention of the safety assurance aspect of the SMS was for the company to use historic risk trends (derived from periodic evaluation of completed FRA forms) to update the company risk profile and determine training strategies.

Orbic Air received one onsite external audit and two virtual/remote external audits from one company as part of its consideration of using Orbic Air. The external company reported that all examined areas received a pass/go rating with no issues reported, and a favorable standing of the owner and company.

In reference to internal audits, the safety manager and SMS system were new to the company. The manager had attended a week-long training event and was still working to understand the program. The manager stated that the internal audits that had been completed did not reveal any significant issues.

According to the SMS manual, findings from the external audits were to be combined with internal evaluation results to establish trends and evaluate the organization. Results from external audits were to be subjected to the same corrective action process as internal audit findings.

Safety Training and Meetings

According to the safety manager, the SMS provided online company safety training that was specifically tailored for the individual's duty position and involvement in the SMS. The training followed a building block approach and was conducted initially as part of the employee's indoctrination and then as annual refresher training. All safety training was documented in each employee's training record.

Safety meetings were conducted in May 2023 and January 2024. The meeting's safety topics included discussions involving SMS notifications requiring training, the effectiveness of the SMS program for the company, and monthly internal audits through the SMS program.

Portable Electronic Devices

Orbic Air approved the Apple iPad as an approved portable electronic device (PED) for use in flight. According to the DO, the company did not provide iPads to its pilots as the helicopters were equipped with navigational instruments and paper navigation charts. According to company personnel, the pilot and safety pilot typically used their iPads with the ForeFlight application and could update their weather briefings via that application.

According to FAA Advisory Circular (AC) 120-76D, Authorization for Use of Electronic Flight Bags (EFB), in part: "*It is intended for all operators conducting flight operations under Title 14 Code of Federal Regulations part 91 subpart K, 121, 125, or 135 who want to replace required paper information or utilize other select applications as part of EFB functionality. This AC sets forth an acceptable means, but not the only means, to obtain FAA authorization for the operational use of EFBs utilizing both portable devices or installed equipment evaluated by the operator as their means to display operating information with an equivalent level of accessibility, usability, and reliability to the means they replace.*"

Additional Information

Pilot's Spatial Disorientation

The helicopter flight data showed multiple altitude, airspeed, and heading changes near the end of the flight consistent with a loss of outside visual references. FAA guidance notes that the need to use outside visual references is natural for helicopter pilots and that avoiding entering IMC during VFR flight is critical for even instrument-rated pilots in IFR-equipped helicopters. The guidance considers a VFR flight's encounter with IMC, during which the pilot may be unprepared for the loss of visual reference, to be a life-threatening emergency. This is because, following the loss of visual cues in flight, pilots are susceptible to experiencing vestibular illusions, which can lead to spatial disorientation and loss of aircraft control.

Vestibular illusions occur when the human vestibular system of the inner ear produces a false sense of helicopter attitude and trajectory. The vestibular system allows a person to have a sense of balance and spatial orientation. However, the vestibular system cannot distinguish between accelerations and tilt. Additional sensory inputs, such as visual cues, are needed for a person to correctly perceive attitude, bank angle, and acceleration. In the absence of outside visual references, a pilot's misperception of any of these flight conditions can result in spatial disorientation. A pilot's consistent scan and correct interpretation of the flight instruments and belief in their representation while operating in IMC can enable the pilot to resist reacting to compelling vestibular illusions and prevent spatial disorientation.

Benefits of Flight Data Monitoring Program (FDM)

Orbic Air did not have and was not required to have an FDM program, which involves the recording and analysis of flight-related information to help pilots, instructors, and operators improve performance and safety. An FDM program, which can be integrated into an SMS, has the potential to provide important information regarding pilot performance during flights, which may be particularly beneficial for operators like Orbic Air that conduct single-pilot operations and, thus, have little opportunity to directly observe their pilots in the operational environment.

FDM programs typically involve the use of an onboard device that is capable of recording various flight parameters or video installed on each aircraft in an operator’s fleet. Periodic review of the recorded data enables an operator to identify deviations from company procedures, established norms, and other potential safety issues. For example, data reviews from company flights may help a company identify deviations, gather information to better understand the context of those deviations, and take proactive measures to implement mitigations and corrective action before an accident occurs.

The NTSB has long recognized the value of a FDM program, starting with Safety Recommendation A-09-90, issued in 2009, which recommended the FAA require helicopter air ambulance operators to establish a structured FDM program and install recording devices capable of supporting it. The FAA’s February 21, 2014, final rule, “Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations,” required helicopter air ambulance operators to equip their fleet with recording devices but did not require them to establish an FDM program. In our September 11, 2014, letter to the FAA, we noted that a mandate for FDM programs was needed to identify deviations from established norms and procedures and to identify other potential safety issues, and we asked the FAA to provide details of its plans for addressing this part of the recommendation.

In its November 1, 2017, response, the FAA expressed concerns that, because the protections of Part 193, “Protection of Voluntarily Submitted Information,” are available only if the data are collected by operators as part of a *voluntary* FAA-approved program, it did not intend to mandate the programs. In our response to the FAA, we emphasized that the intent of our recommendation was for operators to establish internal FDM programs, which would not share collected data with the FAA, and, thus, the data would not need protections. However, based on the FAA’s response that it would not mandate FDM programs as we recommended, we classified Safety Recommendation A-09-90 “Closed—Unacceptable Action.”

On November 3, 2016, we issued Safety Recommendation A-16-34, which recommended that the FAA require all Part 135 operators to install flight data recording devices capable of supporting an FDM program. On the same date, we issued Safety Recommendation A-16-35, which recommended that the FAA, after the action in Safety Recommendation A-16-34 is completed, require all Part 135 operators to establish a structured FDM program that reviews all available data sources to identify deviations from established norms and procedures and other potential safety issues.Due to our ongoing interest in this area and the importance of these recommendations, we included them in the NTSB's 2019-2020 Most Wanted List of Transportation Safety Improvements for the issue area, "Improve the Safety of Part 135 Aircraft Flight Operations."

In response to Safety Recommendation A-16-34, on January 9, 2017, the FAA said it would conduct a review to determine the feasibility of requiring all Part 135 certificate holders to install FDM recording devices on their aircraft. The FAA noted that it had conducted a similar review when considering the development of the helicopter air ambulance final rule and determined that a requirement for such devices did not meet the cost-benefit requirements for safety. However, Congress mandated the equipment requirement in Section 306(a) of the FAA Modernization and

Reform Act of 2012, which stated that revised regulations should apply only to Part 135 certificate holders providing air ambulance services. As a result of the Congressional mandate, the February 21, 2014, helicopter air ambulance final rule contained the mandate for the FDM equipment on helicopter air ambulances. Regarding the FAA's new review for Safety Recommendation A-16-34, the FAA noted that a key focus would be to determine the feasibility of achieving a favorable cost-benefit ratio.

On April 6, 2017, we replied that we reviewed the regulatory evaluation of the February 21, 2014, final rule. We noted that the regulatory evaluation showed costs of approximately $20.4 million over a 10-year period and that we were surprised to see that the benefits amounted to $0. We issued Safety Recommendation A-16-34 because an FDM program, which requires that aircraft be equipped with appropriate recording systems, offers a great opportunity for operators to improve the safety of their operations and avoid accidents.

A review of NTSB major aviation accident investigations involving Part 135 on-demand operators during the period of 2000 through 2015 found seven accident investigations with findings related to pilot performance. In these seven accidents, 53 people were fatally injured and another 4 were seriously injured. The NTSB believes that an effective FDM program can help an

operator identify issues with pilot performance and, through an SMS, lead to mitigations that will prevent future accidents. As a result, the NTSB does not believe it is appropriate to indicate that there are no quantifiable benefits from a mandate for FDM equipment and programs.

In response to Safety Recommendation A-16-35, on January 9, 2017, the FAA replied that it previously considered mandating FDM programs as a part of the development of the February 21, 2014, helicopter air ambulance final rule and determined that its voluntary programs were successful for monitoring and evaluating operational practices and procedures. The FAA also said it believed that maintaining a voluntary nature was paramount to the success of FDM programs and that it planned to review the level of participation of Part 135 certificate holders in the FAA's voluntary FDM programs.

In the 8 years since we issued these recommendations, we have reiterated Safety Recommendation A-16-34 six times based on the findings from our investigations of other fatal accidents involving Part 135 operators that did not install flight data recording devices capable of supporting a FDM program. On September 18, 2023, in response to Safety Recommendation A-16-34 and -35, the FAA replied that it cancelled its rulemaking project that was related to these recommendations. Currently, Safety Recommendation A-16-34 and -35 are classified Open—Unacceptable Response.

Crash-Resistant Flight Recorder Systems

A crash-resistant flight recorder system capable of capturing audio and images could have provided valuable information to aid in identifying additional safety issues in this investigation.

The NTSB has previously issued recommendations to require recorders on helicopters, such as on the Airbus EC 130B4 helicopter involved in this accident. On May 6, 2013, the NTSB issued Safety Recommendation A-13-13 to recommend that the FAA require a crash-resistant flight recorder system compliant with Technical Standard Order (TSO) C197, "Information Collection and Monitoring Systems," as a retrofit on existing turbine-powered, nonexperimental, nonrestricted-category aircraft that are not equipped with an FDR or CVR and are operating under Parts 91, 121, or 135. The crash-resistant flight recorder system should record cockpit audio and images with a view of the cockpit environment to include as much of the outside view as possible, and parametric data per aircraft and system installation. Safety Recommendation A-13-13 is currently classified Open—Unacceptable Response.

In addition, on June 2, 2020, the NTSB issued Safety Recommendation A-20-29 to six helicopter manufacturers (including Airbus) to recommend that they provide, on existing turbine-powered helicopters that are not equipped with an FDR or CVR, a means to install a crash-resistant flight recorder system that records cockpit audio and images with a view of the cockpit environment to include as much of the outside view as possible and parametric data per aircraft and system installation, all as specified in TSO C197. The recorder system installation should be considered essential equipment that remains installed for the life of the helicopter and have provisions to ensure it remains operational during each flight. Safety Recommendation A-20-29 is currently classified Open—Acceptable Response.

Orbic Air Postaccident Actions

On November 14, 2024, Orbic Air's DO reported that the company revised and implemented changes to their standard operating procedures to include items for establishing airspeed and altitude decision points, training pilots on the use of airspeed and altitude decision points as part of IIMC avoidance training, mandate obtaining a standard weather briefing, defining the safety pilot duties and responsibilities, identify safety pilot training tasks and document accordingly, and adopt/utilize the FAA AC on the use of EFBs.

Administrative Information

Investigator In Charge (IIC):	Sauer, Aaron
Additional Participating Persons:	David Gerlach; FAA; Washington, DC Steve Gould; Orbic Air LLC; Burbank, CA Vincent Ecalle; Bureau d'Enquetes et d'Analyses Seth Buttner; Airbus Helicopters North America; Grand Prairie, TX Bryan Larimore; Safran Group; Grand Prairie, TX
Original Publish Date:	May 6, 2025
Last Revision Date:	
Investigation Class:	Class 2
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=193770