
**NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety
Washington, D.C. 20594

December 10, 2021

## Group Chairman's Factual Report

# OPERATIONAL FACTORS / HUMAN PERFORMANCE

ANC20MA010

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## ACCIDENT

Location: Lihue, Hawaii
Date: December 26, 2019
Time: 1657 Hawaii standard time
Aircraft: Airbus AS350 B2

## OPERATIONAL FACTORS/HUMAN PERFORMANCE GROUP


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## SUMMARY


On December 26, 2019, about 1657 Hawaii standard time, an Airbus AS350 B2 helicopter, N985SA, was destroyed when it was involved in an accident about 24 miles northwest of Lihue, Hawaii. The pilot and six passengers were fatally injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* (CFR) Part 135 on-demand air tour flight.


## DETAILS OF THE INVESTIGATION

Prior to arrival to Lihue, Hawaii, the operational factors investigator began requesting documents and information pertaining to the accident from the Federal Aviation Administration (FAA) and Safari Aviation, Inc. On December 29, 2019, the operational factors investigator traveled to Lihue, Hawaii, attended an organizational meeting led by the investigator-in-charge, and formed an operational factors group.

From the company, the group collected fuel receipts, weight and balance, copies of the operating manual, operations specifications, normal and emergency checklists, the trip sheet for the accident flight, the accident pilot's flight time summary, 30 days of time and duty records, training records, and a copy of the weather report for the day of the accident.

From the FAA, the group collected copies of the accident pilot's certification record, medical history, and information from the National Program Tracking and Reporting Subsystem for the accident pilot and the company. The operations group concluded its on-scene investigation on January 4, 2020.

Following the on-scene investigation, the NTSB NRS for human performance joined the group, which became a combined operational factors and human performance group. The group re-interviewed the director of operations, an earwitness to the accident, and two pilots from other air tour operators who were flying in the Waimea Canyon area around the time of the accident. The group also interviewed current and former FAA staff at the Honolulu Flight Standards District Office (FSDO), and an FAA employee at headquarters who was responsible for revising the Hawaii Air Tour Common Procedures Manual (HATCPM).

## FACTUAL INFORMATION

### 1.0 History of Flight

The company was closed for business the day before the accident on December 25, 2019. On December 26, air tour operations resumed and were conducted by two pilots, the accident pilot and another company pilot utilizing two Airbus AS-350 B2 helicopters, N702SA and N985SA. The flight schedule revealed that the accident pilot was considered the number two/secondary pilot for the day, and the other company pilot was considered the number one/primary pilot for that day. The company normally designated the primary pilot to operate the first six flights, and on days when more than six flights were scheduled a secondary pilot would fly the additional flights. On this day, the primary pilot was scheduled to fly six flights, four standard-length (50 minute) tours and two longer tours that included an intermediate landing on the southwest side of the island, whereas the accident pilot (hereafter referred to as "the pilot") was scheduled to fly eight 50-minute tours. The pilot's eight tours were scheduled to depart at 0825, 0925, 1025, 1125, 1325, 1425, 1525, and 1625.

According to the primary pilot, the pilot arrived at the company office about 0645 on the morning of the accident and printed weather information at 0700. The printed weather was signed by the pilot and the primary pilot. For more information, see section 3.0 Meteorological Information.

The pilot's flight preceding the accident flight departed Lihue Airport, Lihue, Hawaii (LIH) at 1515. A passenger on that flight told investigators the flight was "smooth and calm with no concerning situations."[1] He was unable to recall details about the weather conditions. A Blue Hawaiian Helicopter pilot who departed LIH and flew the same route five minutes ahead of that flight, stated in a post-accident interview that he encountered no adverse weather. Company records indicate that the accident pilot returned to LIH about 1616.

About 1540, an earwitness to the accident parked near the head of the Nualolo Trail (elevation 3,700 feet, about 1.2 nautical miles east-southeast of the accident site and 800 feet

[1] See Attachment 1, Statement provided by passenger Kevin Stack.

higher in elevation). He recalled that the weather in the area was overcast but not raining. He began hiking down the Nualolo trail in a northwesterly direction.

A Sunshine Helicopters, Inc. pilot who transited the Na Pali Coast about 1600 said that he saw adverse weather moving in from offshore. The earwitness recalled that about 1600 it began to rain and become "a little foggy." He continued walking down the trail.

Safari Aviation's primary pilot took off from an intermediate landing site on the southwest side of the island at 1606 during one of his longer tours.[2] He transited the Na Pali Coast about 1630. He later told investigators that he saw a weather system "starting to move in" at that time, and that he recalled telling his passengers they were lucky because they had "just beaten the weather."

The previously mentioned Blue Hawaiian pilot departed LIH on another tour at 1610 (per onboard video). He entered the south end of Waimea Canyon about 1625 and observed "a big front coming in or at least...clouds and rain.... from the west." Onboard video from his helicopter showed low clouds and reduced visibility at the north end of Waimea canyon.

The Blue Hawaiian pilot told investigators he observed a reporting point on the northwest rim of Waimea Canyon called "Upper Microwave" (located at 22º 04' 46.58" N, 159º 40' 00.33", W, elevation 3,490 feet msl) was obscured, and a nearby secondary reporting point called "Lower Microwave" (22º 03' 10.69" N, 159 º 39' 42.09" W, elevation 2,922 feet msl) that was also located on the northwest rim was nearly obscured.[3]

The tour route is depicted in Figure 1, and an enlarged view showing the location of Upper Microwave is depicted in Figure 2.

[2] This off-airport landing was included as part of an "Eco-Tour" package.

[3] Compulsory reporting points for Hawaii Air Tours were described in Part 136, Appendix A, of the Hawaii Air Tours Common Procedures Manual. Upper Microwave was a compulsory reporting point when using the primary route for exiting the northwest side Waimea Canyon. Lower Microwave was an alternate compulsory reporting point when using a slightly lower secondary route for exiting the northwest side of Waimea Canyon.

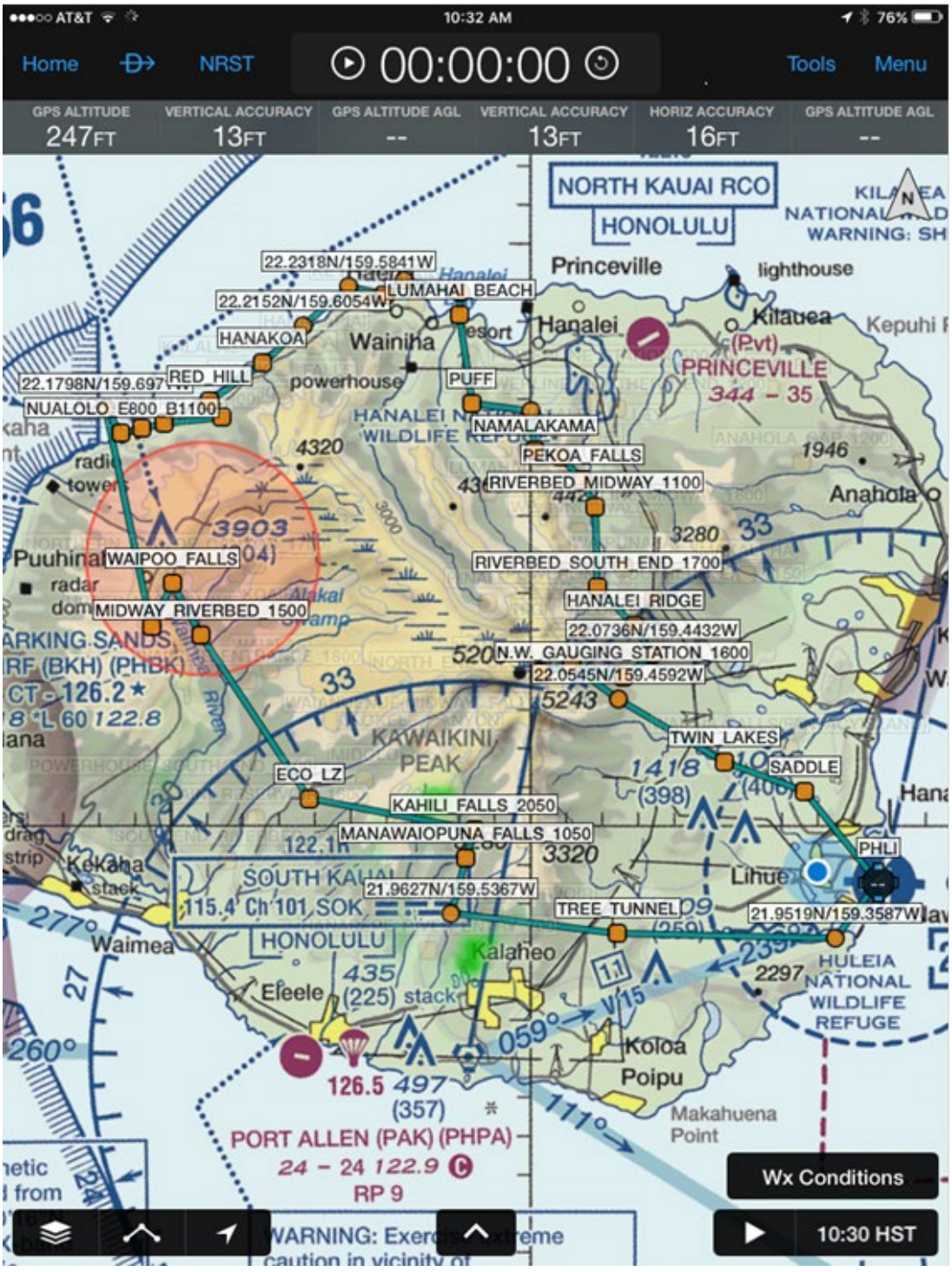


**Figure 1: Depiction of air tour route provided by Safari Helicopters.**


**Figure 2: Close-up of air tour route showing the location of Upper Microwave.**

A second Blue Hawaiian pilot who was also flying nearby told investigators, "I would not have even attempted... to go Upper Mic. That didn't look good at all. It was just down to the ground gray and ugly."

Onboard video indicated that both Blue Hawaiian pilots diverted from Waimea Canyon and headed in a northeasterly direction toward Wainiha about 1629 (per onboard video).

At 1632, the accident pilot radioed company headquarters on 130.00 Mhz, reporting a takeoff time of 1631. Very little is known about the accident helicopter's subsequent flight path. The helicopter was not equipped with onboard video or data recorders, and no video or photos were recovered from passenger personal electronic devices.[4]

Safari's primary pilot recalled that about 10 minutes before he landed at LIH at 1643 (or about 1633), he heard a pilot from Island Helicopters radio the accident pilot saying the Na Pali Coast was "looking rough." The NTSB operations investigator contacted Island Helicopters to identify and interview this pilot, however, the director of operations for Island Helicopters stated that he had no knowledge of any of his pilots being involved in this interaction.

The previously mentioned Sunshine Helicopters pilot estimated that he departed LIH on a tour flight about 1630, however, onboard video time stamps from his helicopter indicated that he departed at 1640. As he was crossing the Olokele Valley, he heard the pilot transmit that he was passing Upper Mic. The Sunshine Helicopters pilot stated that, based on this transmission, he believed the accident pilot was about five minutes ahead of him. He stated, "When I heard that, I actually continued to that area thinking that there might be, you know, the preferred route is to go that way. So I went up there to see if I could also go to -- take that route…"

The earwitness reported that heavy rain began to fall on the Nualolo Trail between 1600 and 1645. He stated that he had almost reached the trail's two-mile marker about 1645 or 1650, and he was standing on a small ridge when he began to hear a helicopter (investigators obtained GPS coordinates from the earwitness and determined that he was standing 0.27 nm northeast of the accident site, and he was at an elevation of 3,100 feet). It sounded as if the helicopter was hovering above and beside him. He was wearing a hooded raincoat and picking flowers, so he had not previously been paying attention to changes in the visibility, but at that time he noticed that the fog had become very dense, and he could not see the helicopter. The earwitness estimated that the helicopter was hovering near him for 30 to 50 seconds. After that, it sounded to him as if the helicopter was turning or moving across the sky. This sound was followed by a strange squealing noise. After the squealing noise occurred, he could no longer hear the helicopter. The earwitness ran some distance down the trail looking for it, but the fog was so dense, he could only see about 20 feet in front of him, so he hiked back to the trailhead. As he made his way uphill to the trailhead (elevation 3,700 feet) the fog became less dense.

[4] Several personal electronic devices were recovered at the accident site and sent to the NTSB recorders laboratory, but the NTSB was unable to obtain any photos or video from the devices. For details, see the Electronic Devices Specialist's Factual Report.

The accident site was about a half-mile east of the standard tour route. The helicopter was traveling in a southerly direction when it struck terrain (see figures 3-5 for illustrations of the helicopter's approximate direction of flight at time of impact, the location of the standard tour route segment for that part of the island, and terrain surrounding the accident site).

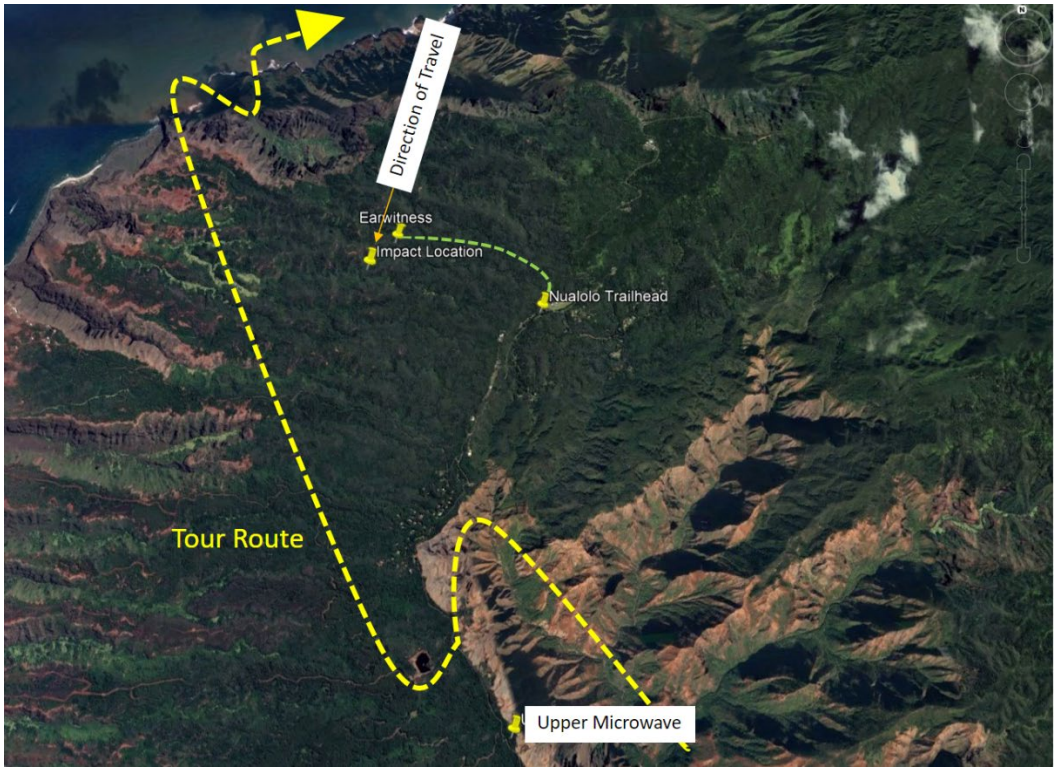


**Figure 3. Overhead view of the normal tour route, accident and witness locations.**

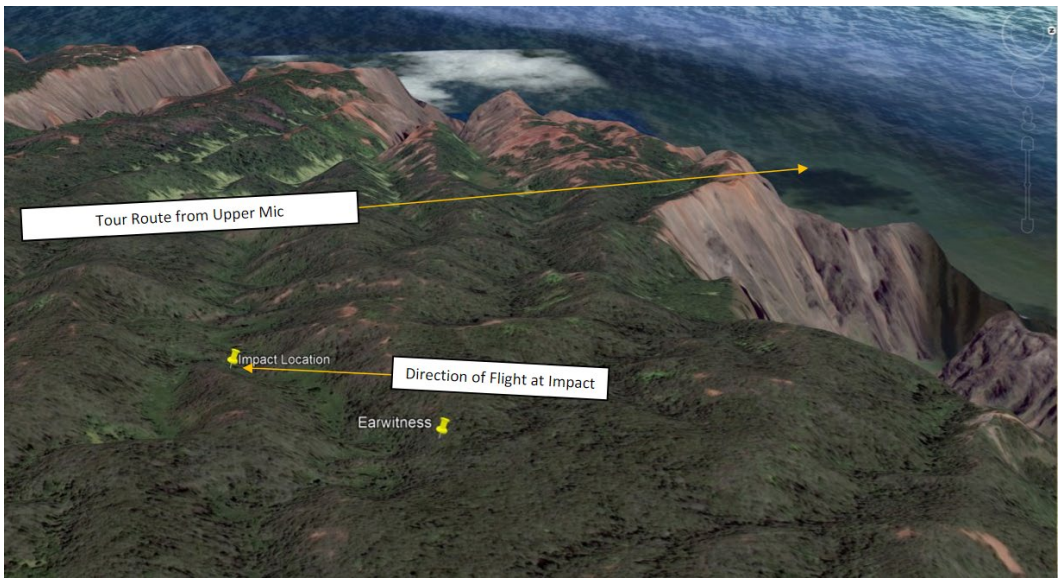


**Figure 4. Terrain between the accident location and the Na Pali Coast.**

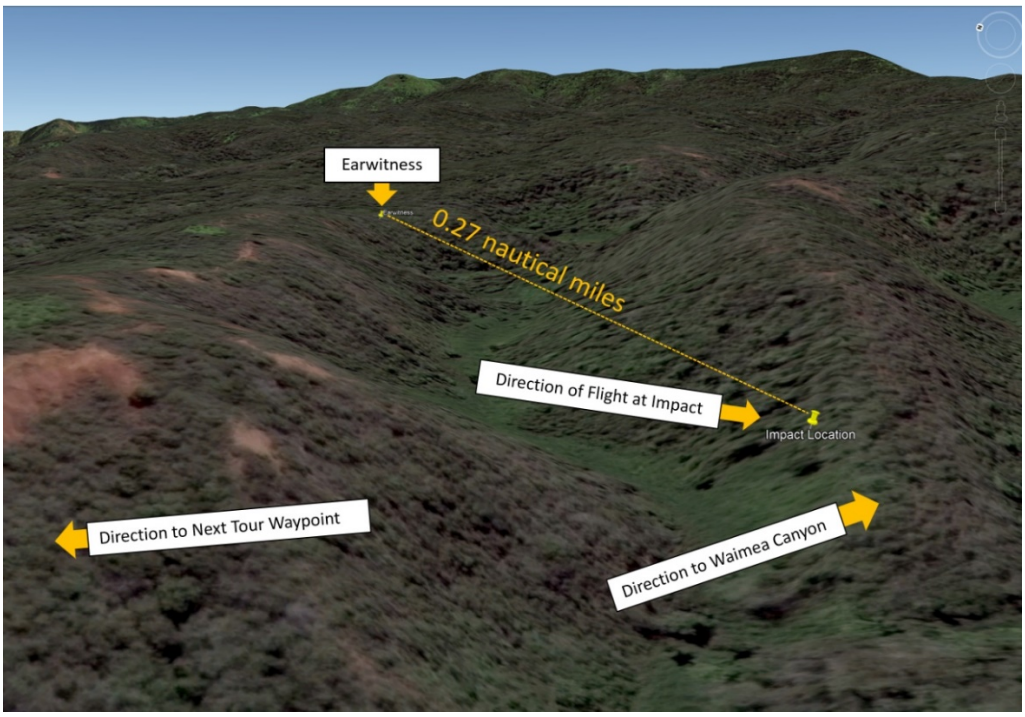


**Figure 5. Terrain in the vicinity of the accident site.**

A clock on the accident helicopter's instrument panel stopped at 1657. In a post-accident interview, the director of operations said that the clock setting was calibrated by company maintenance and the clock was required to be working for the helicopter to fly. He stated that he had high confidence in the accuracy of the clock setting.

Onboard video indicated that the Sunshine Helicopters flight arrived at the north end of Waimea Canyon at 1657. The video showed that low clouds, rain, and reduced visibility were present there. That pilot reversed course at the north end of the canyon and then climbed over the northwest rim of the canyon near Upper Mic about 1658. The pilot proceeded north at a low height above terrain. Rain, low clouds, and low visibility were present. In a post-accident interview, the Sunshine Helicopters pilot commented that the weather "wasn't as good as I thought it would be. … I wasn't sure at that point because there was still kind of a path, and I thought it might have kind of opened up. So I went for a little bit longer to kind of see, but at that area when I was there, it was junk weather for sure."

About a minute and a half after climbing over the northwest rim of the canyon, the Sunshine Helicopters pilot reversed course, crossed back over the rim of the canyon about 1701, and descended back into the canyon before diverting northeast to Wainiha. The Sunshine Helicopters helicopter was equipped with an automatic dependent surveillance broadcast (ADS-B) unit that broadcast the helicopter's position during this flight, however, some returns were missing because of terrain interference. During a post-accident interview, the Sunshine Helicopters pilot sketched his route of flight west of Waimea Canyon in an area where ADS-B returns for his flight were not received. This sketch (orange line) is reproduced in Figure 6 alongside the ADS-B returns that were available for his flight.

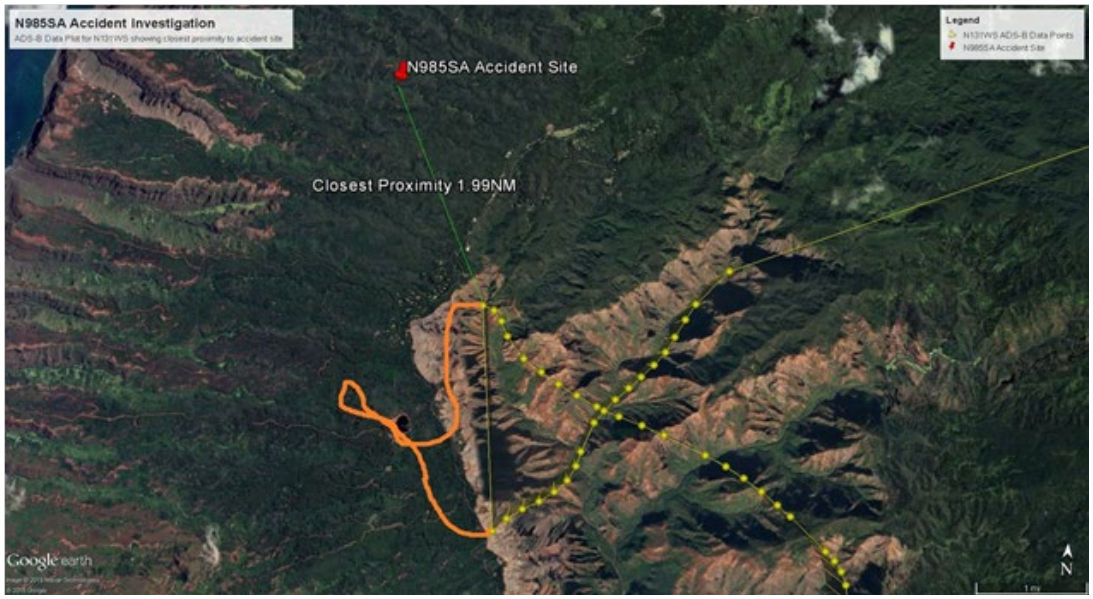


**Figure 6: Accident location and ADS-B track of Sunshine Helicopters. The orange track was drawn by the Sunshine Helicopters pilot to estimate his ground track in an area that lacked ADS-B coverage.**

At 1731, the director of operations was notified by the company's flight follower that the accident helicopter was overdue. Flight locating procedures were initiated, prompting a widespread search and rescue effort conducted by multiple agencies.

LIH air traffic control reported that Safari 2, the Safari helicopter piloted by the primary pilot as part of the search and rescue effort, was cleared for takeoff at 1814, and at 1832, Safari 2 returned to the LIH after being unable to locate the missing company aircraft. The primary pilot recalled seeing poor weather on the tour route beyond the location of Upper Mic.

On December 27, 2019, at 0931, the aircraft wreckage was spotted by a rescue helicopter. The wreckage was in a ravine in an uninhabited area of Koke'e State Park. The helicopter had impacted the north side of a small ridge while flying in a south/southeasterly direction. Photos of the accident location are shown in figures 7 and 8.

**Figure 7: Photo showing the north face of the ridge impacted by the helicopter (red circle highlights impact location)**

**Figure 8: Photo showing terrain scarring from the impact oriented on a south/southeasterly direction.**

## 2.0 Personnel Information

The pilot, age 69, held a commercial pilot certificate with a helicopter rating and a mechanic certificate with airframe and powerplant ratings. He first began employment with the company as a line pilot October 27, 2007, and at the time of the accident he was the company's chief pilot and check airman, and he also served as a company instructor.[5]

On May 3, 2010, the FAA issued an emergency order of revocation of the pilot's private and commercial pilot certificates after he tested positive for a marijuana metabolite during a random drug test administered as part of the company's mandatory drug and alcohol testing program. Safari terminated the pilot's employment at that time.

On March 23, 2011, he was evaluated by a substance abuse professional who reported the pilot's successful completion of a drug and alcohol safety program. On March 30, 2011, he was issued a third class medical. On February 3, 2011, he was re-hired by Safari in a non-safety sensitive position as a front desk employee and shuttle bus driver. After March 23, 2011, he assumed the safety sensitive duties of an airframe and powerplant mechanic. On June 30, 2011, he was re-issued private and commercial certificates with rotorcraft – helicopter ratings. On July 6, 2011, he was issued a second-class medical certificate and on July 10, 2011, he returned to flight status with Safari Helicopters. The pilot's subsequent drug and alcohol tests were negative.

A search of the National Driver Registry performed by the company as required by the Pilot Records Improvement Act on November 5, 2007, found no record of driver's license suspension or revocation, and a post-accident search of the National Driver Registry also revealed no license suspensions or revocations.

The pilot's wife stated that the pilot had planned to retire in July 2020.

### 2.1 Pilot's Certification History

Mechanic – Airframe and Powerplant (certificate and ratings issued March 1, 1990).

Private Pilot – Airplane Single Engine Land (certificate and rating originally issued September 24, 1974), Rotorcraft - Helicopter (revoked May 3, 2010, and reissued June 30, 2011).

Commercial Pilot – Airplane Single Engine Land (certificate and rating issued May 4, 1976), Rotorcraft – Helicopter (rating issued May 4, 1976), Airplane Multiengine Land (rating issued August 16, 1976), Rotorcraft – Helicopter (revoked May 3, 2010, and reissued June 30, 2011).

Flight Instructor – Rotorcraft - Helicopter (certificate and ratting issued - February 23, 1977, reissuance - February 2, 1979, renewal - February 11, 1981, renewal – January 25, 1983, reinstatement – December 17, 2008, revoked May 3, 2010).

[5] The company had another pilot who served as a company instructor and was based in Hilo.

## 2.2 The Pilot's Certificates and Ratings Held at Time of the Accident

Commercial Pilot – Rotorcraft - Helicopter

Medical Certificate – Second Class (issued July 1, 2019) with the following limitation: Must wear corrective lenses and possess lenses for near and distant [vision].

## 2.3 The Pilot's Training and Proficiency Checks

| | |
|---|---|
| Initial Competency Check | October 31, 2007 |
| Re-Hire Initial Competency Check | July 10, 2011 |
| Date of Most Recent Competency Check | July 16, 2019 |
| Date of Most Recent PIC[6] Line Check[7] | July 16, 2019 |
| Date of Most Recent Instructor Observation Check | July 12, 2017 |
| Date of Most Recent Check Airmen Observation Check | July 18, 2018 |
| Date of Most Recent Recurrent Training | April 13, 2019 |
| Date of Most Recent Part 136 Training | April 10, 2019 |

The pilot's most recent Part 135.293 competency check was conducted on July 16, 2019, by an operations inspector from the FAA Flight Standards District Office, Anchorage, Alaska, in coordination with the Safari principal operations inspector (POI). The check was 0.7 hours in duration and utilized the accident helicopter. The pilot satisfactorily completed all elements of the check. The inspector's remarks in the competency/proficiency check form 8410-3 were as follows: "Demonstrated unusual attitude recovery, IMC, in accordance with CFR Part 135.293(c)". Part 135.293(c) stated, in part:

> "…a demonstration of the pilot's ability to maneuver the rotorcraft solely by reference to instruments. The check must determine the pilot's ability to safely maneuver the rotorcraft into visual meteorological conditions following an inadvertent encounter with instrument meteorological conditions."

The Anchorage inspector told investigators these checks were conducted in visual flight rules (VFR) conditions, and they consisted of flying an actual air tour route segment in accordance with the requirements in the HATCPM for about 20 minutes, followed by some maneuvers in a practice area.

The inspector said the checks were completed in accordance with FAA guidance, there was nothing unusual about them, and the outcomes were satisfactory. He said the pilot exhibited "exceptional knowledge" of weather and was "very knowledgeable" about the island. A view limiting device was used for instrument maneuvers, which included a nose-up and a nose down unusual attitude recovery, turns with a navigational malfunction, and heading and altitude changes. The inspector told investigators a standard rate, climbing turn was difficult to perform on instruments if a pilot was not proficient with instrument flying, but the pilot had been able to

satisfactorily complete this maneuver. He thought the pilot's overall performance was above average compared to other pilots he had checked.[8]

An FAA operations inspector from the Honolulu FSDO, who conducted the accident pilot's Part 135 competency check the previous year (in 2018), told investigators the pilot's performance was satisfactory during that check. His assessment was that the pilot was a "fantastic pilot," and that there were "no issues whatsoever" with the check.[9]

### 2.4 The Pilot's Flight Experience

On the application for his most recent medical certificate dated July 17, 2019, the pilot reported 14,000 hours of total flight experience, with 475 hours in the last 6 months. Investigators recovered a logbook belonging to the pilot from the office of Safari Aviation. The most recent entry in this logbook was dated 2012. Safari was unable to provide summary records of the pilot's flight time for calendar year 2019. Sheets for some previous years indicated that the pilot typically flew about 40 hours per month, which was consistent with the assistant chief pilot's estimate of the pilot's recent flying. During an interview with the pilot's wife, investigators requested any additional logbooks that might be available, but none were provided. The pilot had about 11 years of experience flying air tours on Kauai. The director of operations estimated that 10 ½ years of the pilot's experience on Kauai was acquired with Safari.

### 2.5 Pilot's Recent Activities[10]

The pilot's wife stated that he typically slept from about 2200 until 0400 or 0500, looked at the weather, had breakfast and showered before leaving for his place of work, which was a 10 to 15-minute drive from their residence. She said that on the day of the accident the pilot left the house about 0600 or 0630 and she expected him to return between 1800 and 1830. She said he usually went to bed about 2200 and in the days before the accident he was asleep from 2200 until 0400 or 0500 each night.

On the day of the accident, the pilot was scheduled to fly eight 50-minute tours and he operated all these flights. According to Safari's primary pilot, the pilot arrived at the airport about 0645. Company records indicated that he returned from his 1125 flight at 1215, had a lunch break, and departed on his 1325 tour at 1322. The director of operations told investigators that when the pilot had flights in the morning and the afternoon, he brought his lunch to work and ate on the flight line. Investigators were unable to obtain details about the pilot's activities during his lunch break. A passenger from the pilot's 1525 flight (the flight immediately before the accident flight) described him as calm, diligent, gracious, alert, and safety conscious.[11]

[8] Interview of Don Andrea
[9] Interview of Christopher Howard

[11] Statement provided by passenger Kevin Stack.

### 2.6 Pilot's Past Weather-Related Decision Making

Investigators asked the pilots' colleagues for impressions of the pilot's weather-related decision making and attitudes toward weather-related risks. Safari's director of operations (who had provided the pilot's initial training at the company) said he had confidence in the pilot, and believed he was "the most conservative pilot" on Kauai. The director of operations had never received any complaints about the pilot's flying.

Safari's part-time pilot (who had flown with the pilot many times) thought the pilot had good judgment, was very experienced, and was 'safety conscious". Safari's primary pilot described the pilot's judgment as "solid." He recounted an occasion when the pilot warned him about flying into "sucker holes" in the weather. The primary pilot told investigators that when the pilot saw other companies operate in poor weather, he disapproved. The primary pilot found it very surprising that the pilot was involved in a weather-related accident.

One of the Blue Hawaiian tour pilots who diverted from Waimea Canyon on the day of the accident told investigators he had been observing the pilot's flying on Kauai for many years and he believed the pilot was "not a big risk taker." He did not think the pilot was reckless or had a "get it done" mentality. He said the pilot took his time and did a "pretty safe job."

A former Safari POI told investigators that in 2016 the accident pilot (who was serving as Safari's chief pilot at the time) reported that one of the pilots he supervised had performed a precautionary landing in a field next to a road while operating an air tour on the island of Hawaii. The pilot told the former POI that the pilot he supervised had done so due to deteriorating weather, and that Safari had picked the passengers up in a van. The former POI told investigators that the pilot asked him to commend the pilot who had executed the precautionary landing because he did not want his pilots to "push the weather". The former POI said this was representative of the accident pilot's attitudes toward weather-related decision making.

A former FAA front-line manager who worked at the Honolulu FSDO from 2007 to 2019 said he was surprised that the pilot had been involved in the accident. He had a high opinion of him.[12] The pilot had always received good check rides, and he had never heard negative complaints about him. He stated, "I didn't see something like that happening to Paul because I thought he was a pretty straight shooter."

## 3.0 Aircraft Information

### 3.1 General

The accident helicopter, an Airbus AS350 B2, was manufactured by Eurocopter in 1998. It was certified as a normal category helicopter under Part 27 on June 8, 1990, and it was powered by a Turbomecca Arriel 1D1 turboshaft engine with a takeoff power rating of 712 shaft horsepower and a maximum continuous power rating of 625 shaft horsepower. The helicopter

[12] Interview Curtis Whaley.

had a limitation of one pilot seat and six passenger seats. The maximum weight was 4,961 lbs. A photo of a sister ship (N702SA) is shown in figure 9.

The helicopter had been previously equipped with a camera system (installed through an STC) that recorded video during flights. There were three external camera locations. A nose camera was pointed forward, cameras in the left and right baggage compartments pointed sideways, and an internal camera showed the cabin. The selection of cameras for recording was made using a pilot-controlled switch. Videos were downloaded to a flash drive and made available for sale to passengers after each tour. They were also available for internal company review. According to the company's representative, the camera system had been removed to make way for an upgrade to a new, high-definition video camera system, therefore no video was recorded during the accident flight. During a post-accident interview, Safari's new director of operations told investigators that the company had opted not to operate with an onboard camera system because if the camera system malfunctioned, they would have to fix it before they could operate the helicopter and they wanted to avoid maintenance-related difficulties.

Company managers told investigators that the helicopter's Aircraft Daily Log page for the day of the accident was carried aboard the helicopter and investigators were unable to recover it. The most recent previous log page, dated December 24, 2019, indicated that the helicopter had no open maintenance discrepancies. Maintenance records indicated that the pilot controls had been relocated from the front right to the front left seat under a supplemental type certificate. The director of operations stated that the company had made this modification to reduce the likelihood of passenger interference. Similarly relocated flight controls in a sister ship are shown in Figure 10.


**Figure 9: Photo of a Safari Helicopters Airbus AS350 B2, N702SA.**

**Figure 10: Supplemental type certificate modification to flight controls in N702SA.**

The helicopter was equipped with the following flight instruments: altimeter, radar altimeter, attitude indicator with slip indicator, airspeed indicator, vertical speed indicator, a horizontal situation indicator, a turn and slip indicator, and a magnetic compass (figure 11).

**Figure 11: N702SA instrument panel.**

The helicopter had a seating configuration which included two rows of seating. The first row included the pilot seat and two passenger seats. The second row included four passenger seats. Headsets, handheld microphones, and passenger briefing cards were available for each passenger. There was a fire extinguisher located between the pilot and front passenger seats shown in Figure 12.

**Figure 12: Front and rear passenger seats in N702SA.**

### 3.2 Weight and Balance Information

The accident helicopter was last weighed April 2, 2018, and it was within the 36-calendar month currency requirement specified in Part 135.185. The company used actual passenger weights obtained using a scale located at the front desk where customers checked in for flights. Table 1 shows weight and balance calculations. Figure 13 shows planned weight and center of gravity (CG) for the accident flight.

| | Weight (lbs) | CG (in-lbs) | Moment (in-lbs) |
|---|---|---|---|
| Basic Empty | 3004.60 | 140.72 | 422807.31 |
| Pilot | 190 | 61.02 | 11592.80 |
| Front Seat Passengers[13] | 244 | 69.50 | 16958.00 |
| Rear Seat Passengers | 569 | 103.00 | 58607.00 |
| Fuel at Takeoff | 440 | 136.81 | 60196.40 |
| Fuel Used | -292 | 136.81 | -39948.52 |
| Baggage | 5 | 181.10 | 905.50 |
| | | | |
| Takeoff | 4452.60 | 128.25 | |
| Landing | 4160.60 | 127.65 | |

**Table 1: Weight and balance calculations.**

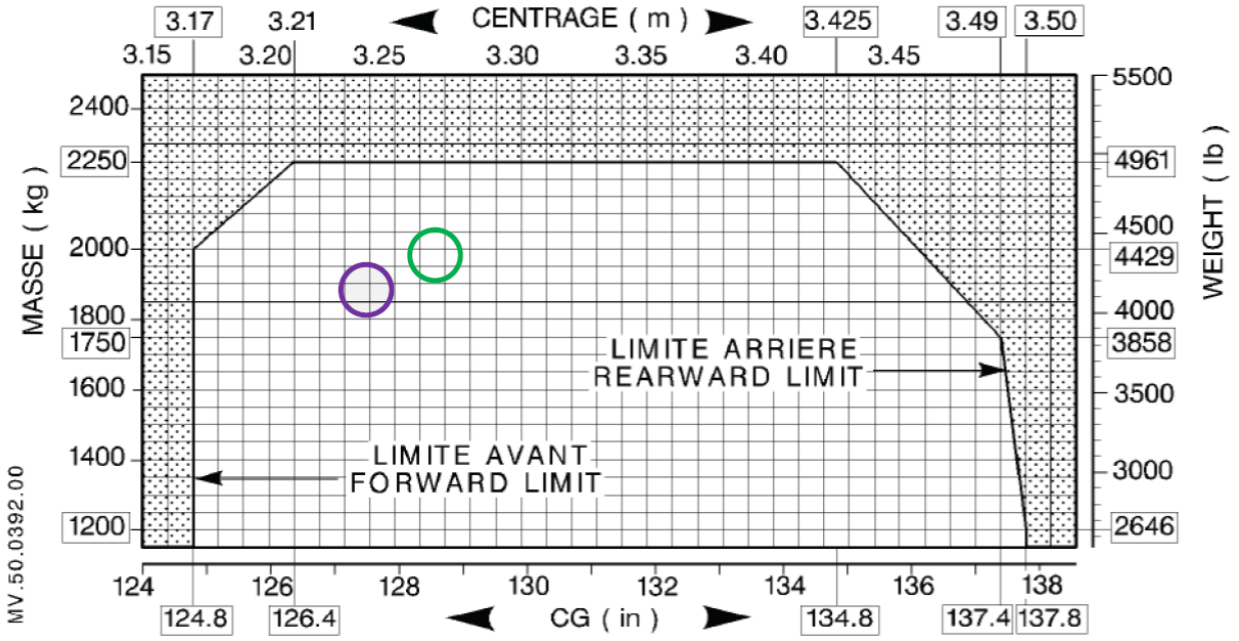


**Figure 13: Estimated takeoff CG (green circle) and landing CG (purple circle).**

### 3.3 Climb Performance

The Airbus AS350 B2 Flight Manual provided climb performance charts. Investigators estimated the outside air temperature and aircraft weight at the time of the accident and determined that the helicopter's climb performance at the time of the accident would have been about 1,700 feet/minute at 55 knots calibrated airspeed.

## 4.0 Meteorological Information

### 4.1 Weather Planning Requirements

Part 135.213 Weather reports and forecasts for VFR operations stated:

"(a) Whenever a person operating an aircraft under this part is required to use a weather report or forecast, that person shall use that of the U.S. National Weather Service, a source approved by the U.S. National Weather Service, or a source approved by the Administrator. However, for operations under VFR, the pilot in command may, if such a report is not available, use weather information based on that pilot's own observations or on those of other persons competent to supply appropriate observations."

According to company Operations Specifications, Paragraph A010 "Aviation Weather Information", the company was authorized to use weather reporting facilities operated by the U.S. National Weather Service (NWS) or a source approved by the NWS. Additional sources of

approved weather were NWS sources outside the contiguous U.S., U.S. military observing and forecasting. The operator did not have approval for an enhanced weather information system.[14]

Safari's operations manual, Appendix 1-18, HELICOPTER ADVERSE WEATHER PROCEDURES, CONDITIONS BELOW PART 136 APPENDIX A MINIMUMS, stated: "During periods of adverse weather, pilots-in-command will utilize all available resources to keep informed of changing conditions."

### 4.2 Pilot's Weather Briefing

The pilot downloaded and printed three pages of weather information labeled "Standard Weather Briefing" from the FAA Flight Service website "1800wxbrief.com" at 0700 on the morning of the accident.[15] The first of these pages was initialed by the pilot and the primary pilot. The print-out included a meteorological terminal air report for LIH, a terminal area forecast for LIH, winds aloft, and a Hawaii area forecast containing details for each major Hawaiian island.

The meteorological terminal air report (METAR) for LIH stated:

> Lihue, HI (PHLI). Dec 26, 1653Z (06:53 HST). Wind from 270 at 5 knots, 10 statute miles visibility, Clear Skies, Temperature 21° C, Dewpoint 19° C, Altimeter is 29.85. Remarks: automated station with precipitation discriminator sea level pressure 1010.7 hectopascals hourly temp 21.1° C dewpoint 18.9° C $

The terminal area forecast (TAF) stated:

> VFR Lihue, Lihue, HI (PHLI). Amended Dec 26, 1316Z (03:16 HST), valid from Dec 26, 1300Z (03:00 HST) until Dec 27, 1200Z (02:00 HST), wind from 240° at 6 knots, greater than 6 statute miles visibility, Sky Clear
>
> VFR From Dec 26, 2100Z (11:00 HST), Wind from 330° at 10 knots, greater than 6 statute miles visibility, Scattered Clouds at 2,500 feet, Ceiling is Broken at 4,000 feet.

The TAF indicated that it was prepared by the Weather Forecast Office, Honolulu Hawaii at 0535Z on December 26, 2019, which had a synopsis valid until 1000Z on December 27, 2019, clouds/weather valid until December 27, 2019, at 0400Z, and an outlook valid from 0400Z to

[14] FAA Order 8900.1 Vol. 3, Ch 26, Sec 4, states: "An Enhanced Weather Information System (EWINS) is a system for gathering, evaluating, and disseminating aviation weather information, and for issuing weather reports and forecasts prepared by properly trained and qualified aviation meteorologists or aircraft dispatchers. An EWINS is generally optional, however; if an EWINS is used to comply with the Title 14 of the Code of Federal Regulations (14 CFR) requirements for weather, it must satisfy the requirements set out below. Weather forecasts issued through an EWINS must be based on weather reports issued by Federal Aviation Administration (FAA)- and/or National Weather Service (NWS)-approved sources."

[15] Source of the weather information confirmed by the primary pilot via email on 10/10/2021.

1000Z on December 27, 2019. The section of the area forecast applying to Maui, Lanai, Molokai, Oahu, Kauai, and adjacent waters stated:

> Scattered clouds at 2,000 feet scattered to broken clouds at 4,500 feet tops at 8,000 feet isolated broken clouds at 3,000 feet tops at 9,000 feet visibility 5 statute miles rain showers mist. Outlook… VFR.

Visual meteorological conditions prevailed at LIH at the time of the accident. For additional meteorological information, see the Meteorological Group Chairman's Factual Report.

### 4.3 Hawaii Pilot Impressions of Local Weather Patterns

A former POI assigned to Safari stated that weather conditions were dynamic and highly variable across the island. He stated that the island was subject to mechanical uplifting of air masses as the trade winds hit the mountains, creating frequent rain showers. Safari's POI at the time of the accident said the leeward side of the island received less than ½ inch of rainfall annually while the windward side received about 400 inches.

A general aviation POI at the Honolulu FSDO stated the following about the weather on Kauai:

> The weather on those islands is really moving fast. So the major issue is always when they depart the airport, have they received their briefing -- weather briefing? They may not be able to see the weather in the back of the mountains or in the back of the valleys, so the pilot is responsible to identify that when he arrives on location. That's how the weather is looked at. They get weather briefing before the flight. They get pilot reports from other pilots inside the airport. But the weather moves fast in the islands, so those weather updates may not be as accurate as you want to be. [16]

Safari's director of operations stated the following with respect to Kauai weather patterns:

> …our weather primarily is northeasterly trades. …we have a valley called the Hanalei Valley, which is a tropical rainforest without 200 inches of rain per year, which is most likely in an area where we have more weather in this valley than any other place on the Island during a tour. And that's an example that we would talk about the weather being really (indiscernible) in that particular location. As I recall, the day of the accident, we had weather coming in from the west side, southwest side of the Island, which was not normal. And we just don't -- we get the northeast trades as a primary means of weather areas that would be possibly heaviest rain expected, et cetera. There's no way to train on an unusual weather day, which I believe happened on the day of the accident.

[16] Interview Gino Rezzonico.

Asked to comment on the potential impact of this weather pattern on the accident pilot's decision making, the director of operations stated: "From my perspective as a pilot, who has flown around the island, it's just highly unusual to have that kind of weather pattern. That's very difficult to anticipate."

Safari's Sunday secondary pilot, who had been flying on Kauai for many years, said fronts that approached from the west or southwest were challenging because pilots were taking off into the weather and could not really see "around the corner."

Pilot charts maintained by the National Geospatial Intelligence agency indicated that westerly and northwesterly winds were statistically unusual for Kauai.[17] For additional information about Kauai weather, see the Meteorological Group Chairman's Factual Report.

### 4.4 Private Weather Cameras

Safari's primary pilot utilized three privately-operated webcams to supplement approved sources of weather information during preflight planning, but they were sometimes out of service. One was located on the south side of the island near Poipu Beach. It provided a view of weather conditions on the south shore. A second camera on the north shore showed a view looking inland from the coast toward the Hanalei Valley. A third camera (which had not been operational the week before the pilot's interview) was in Hanalei and it showed a westerly view toward Ke'e Beach. The primary pilot said that he typically looked at these cameras at home before going to work, on the helipad after his preflight inspection, and sometimes between flights when he was refueling. When asked if he thought the installation of weather cameras on the Na Pali Coast would be beneficial for pilots, he said "absolutely". He said the idea of installing FAA weather cameras on Kauai had been discussed for about 13 years.

Safari's assistant chief pilot and Sunday secondary pilot said they relied on the private webcams.[18] The Sunday secondary pilot said he wished there were more weather cameras on the island. He said he would like one installed at Makaha Point on at the west end of the Na Pali Coast, looking east along the Na Pali Coast, and another located inland from Hanalei, showing multiple views. He said he wanted as many weather cameras installed as the government could afford, but he felt that it was particularly important to have one installed on the west side of the island because of weather fronts that occasionally came from the west-southwest.

Safari's Sunday secondary pilot stated that if FAA weather cameras were installed, pilots would be able to look at them between flights, see bad weather approaching, and estimate its rate of travel based on wind speed. He thought such cameras would be a significant improvement over the privately-owned webcams because the private webcams were not designed to provide

[17] National Geospatial Intelligence Agency. (1994). Atlas of Pilot Charts, North Pacific Ocean 3rd Ed., 1994. Downloaded May 16, 2021, from http://msi.nga.mil/Publications/APC.
[18] Safari's Sunday secondary pilot stated that he had worked on and off as a pilot for Safari for 27 years and also served as the director of operations for another air tour operator at the time of the accident.

aviation weather information. Asked what he thought was the most important thing that could be done to improve air tour safety on Kauai, he stated:

> "I think the weather cam issue is really huge. I mean, honestly, if you had a weather cam on Makaha Point facing down Na Pali, that could have saved a life here or seven actually. Because, yeah, the problem with Kauai is you have all these blind spots, and… because of the topography and everything you can't really see everything everywhere all the time. So I think that would be huge."

The Sunshine Helicopters pilot who was flying in Waimea Canyon around the time of the accident stated that he also used the privately owned webcams, and that he wanted to see more weather cameras installed. During informal conversations with other local operators, the NTSB learned that their pilots also used the privately-owned webcams.

### 4.5 FAA Weather Cameras

In an August 15, 2013, letter to the FAA, the NTSB noted that since 1997 it had investigated numerous accidents in Hawaii involving aircraft that had encountered instrument meteorological conditions (IMC) and/or other adverse weather phenomena while operating under day VFR under the provisions of Part 135 or Part 91. These accidents, nine of which involved helicopters and four of which involved single-engine airplanes, resulted in 48 fatalities and 4 minor injuries and substantial damage to the aircraft. Seven of the accidents were sightseeing air tour flights. Generally, the pilots flew into IMC or other adverse weather phenomena, such as rain showers, rain squalls, mist, fog, heavy clouds, and areas of low visibility. In addition, the aircraft were operating in areas of variable terrain, such as mountains, ridges, craters, and volcanos, and the pilots were unable to maintain clearance with that terrain. Citing a 53% reduction in the weather-related accident rate in Alaska following the installation of the Alaska weather camera system, the NTSB recommended that the FAA:

> Initiate an aviation weather camera program in Hawaii that includes the installation and maintenance of aviation weather cameras at critical locations in Hawaii. Establish public access to these aviation weather cameras' real-time imagery. (A-13-25)
>
> Install and maintain aviation weather cameras in those mountain passes in the continental United States identified in its research as being high risk. Establish public access to these aviation weather cameras' real-time imagery. (A-13-26)

In response, the FAA initiated a project to install weather cameras in Hawaii and some other areas of the United States. On April 15, 2020, the FAA Joint Resources Council approved the implementation of an FAA-owned camera system in Hawaii.

On January 29, 2021, the FAA manager of this program briefed NTSB staff that the FAA planned to install 23 weather camera installations in the state of Hawaii, with construction planned to begin April 2021 and be completed by September 2022. A planning map shared with

NTSB staff indicated that the FAA planned to install five of the weather camera systems on island of Kauai (figure 14).

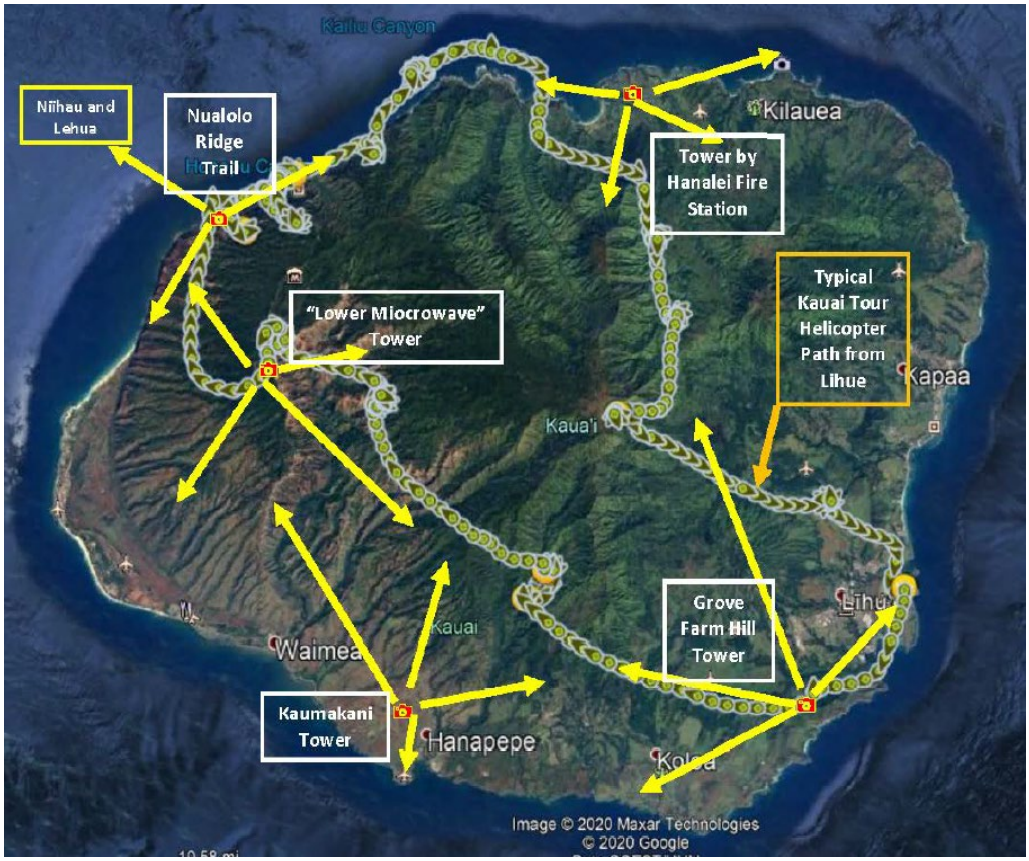


**Figure 14. Map of planned FAA weather camera installation sites on Kauai.**

The FAA manager of the Weather Camera program informed NTSB staff that this project was on schedule, funding was available, and he did not anticipate any obstacles to its completion. During a follow-up discussion on August 24, 2021, the FAA program manager reported that one of the weather cameras was already operational on the southwest side of the island. NTSB examination of the FAA weather camera web site on October 8, 2021, revealed that a second camera located on the northeast side of the island had also become operational (see figure 15).[19]

A Honolulu FSDO POI was asked whether he thought an Alaska-style weather camera system would be beneficial to help air tour pilots in dealing with weather-related challenges. He said yes, adding that pilots had mentioned "heavily throughout the islands that they would love to have it."[20]

[19] Information retrieved from http://weathercams.faa.gov on October 8, 2021.
[20] Interview Gino Rezzonico.

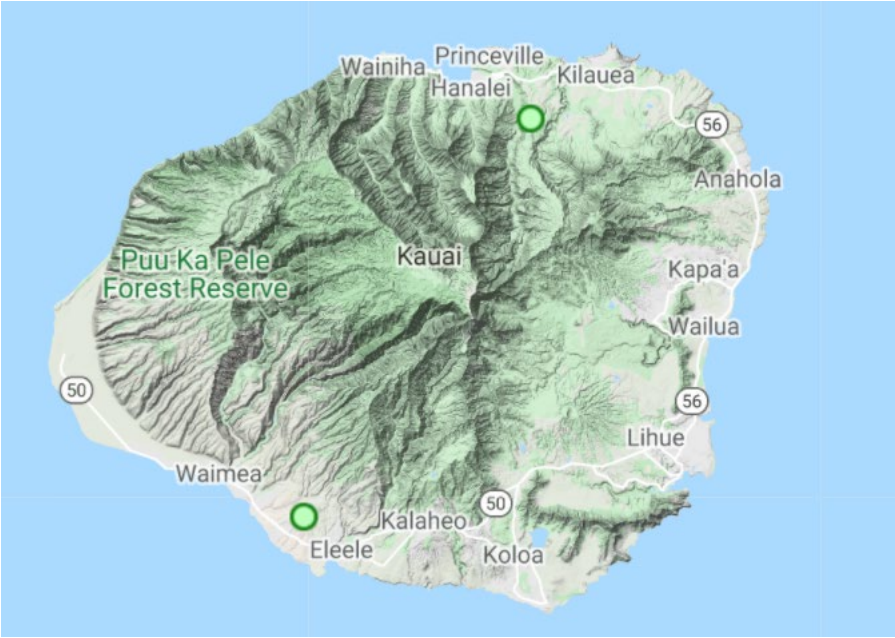


**Figure 15. Location of weather cameras that were providing images to the FAA weather camera web site as of October 8, 2021.**

## 5.0 Communications

### 5.1 Safari Radio Communications

Safari's director of operations said Safari did not have VHF radio communication with helicopters on the north side of the island because of the line-of-sight limitation of VHF radio communication and the high terrain in the center of the island. Safari's Sunday secondary pilot estimated he was out of VHF radio communications for about 30 minutes during each 50-minute tour. He estimated that he would need to climb to 3,000 or 4,000 feet msl to communicate with Safari's base by radio on the north side of the island, and he normally flew about 2,000 feet msl in that area to provide a good tour. Safari's primary pilot stated that after he reported passing the "Tree Tunnel" waypoint on the southwest side of the island and entered the Hanapepe Valley, he was normally out of communication with Safari's base. The current director of operations stated that radio communications were typically lost after a helicopter had traveled about 5 nm northwest of LIH and regained about 10 minutes before it returned to LIH.

### 5.2 FAA Plans to Co-Locate Weather Camera and Communication Services

During the FAA's January 29, 2021, presentation to NTSB personnel on the status of the FAA weather camera program, the FAA program manager stated that the FAA planned to install a suite of non-certified weather sensors at some weather camera locations in Alaska and Hawaii where AWOS was not available. The FAA termed these installations Visual Weather Observation Systems (VWOS). During the FAA's January 29, 2021, presentation on the status of the FAA weather camera program, the FAA program manager also stated that the FAA intended to install radio over internet protocol (ROIP) capability at some VWOS stations in Alaska and

Hawaii where air to ground communications were not available. The purpose of the ROIP equipment would be to facilitate communications between pilots on the ground and FAA Flight Service.

## 6.0 Aids to Navigation

### 6.1 Automatic Dependent Surveillance Broadcast

During a post-accident interview, Safari's director of operations told investigators that Safari's aircraft were not equipped with ADS-B at the time of the accident. He stated that the company had been trying to install new antennas, so they could equip their helicopters with ADS-B out. His director of maintenance had been working with an FAA designated engineering representative to obtain approval for that installation for about six months preceding the accident.

An FAA data file describing ADS-B service in the National Airspace System indicated that existing ADS-B infrastructure could receive ADS-B signals broadcast by aircraft flying at 500 feet agl or higher in some but not all areas above or near the island of Kauai (figure 16).[21]


**Figure 16. ADS-B service for aircraft at 500 feet agl or higher, above or near Kauai.**

## 7.0 Medical and Pathological Information

For medical and pathological information about this case, see the medical officer's factual report.

[21] Retrieved December 10, 2021, from. https://www.faa.gov/nextgen/equipadsb/research/airspace/media/2020ADS-BAirspaceMap.kmz.

# 8.0 Organizational and Management Information

## 8.1 Safari Aviation, Inc.

### 8.1.1 Overview

Safari Aviation, Inc. was owned by its president / director of operations. The company began conducting air tour flights under Part 91 in 1987 and transitioned to Part 135 operations in 1992. The company's main office was in Lihue, Hawaii, on the island of Kauai, and the company had satellite offices in Hilo, on the island of Hawaii, and Honolulu, on the island of Oahu.

In an email dated January 16, 2020, the director of operations told NTSB investigators Safari had accrued 102,000 flight hours and carried approximately 351,000 passengers in the 32 years preceding the accident and had experienced one previous accident during a 2001 maintenance test flight that caused no injuries.

The company had 26 employees. These included nine clerical employees, five maintenance employees, six pilots (although one of the pilots was in the process of leaving the company for another job), five ground operations employees, and one aircraft cleaner. Four of the company's pilots were based in Lihue, and two were based in Hilo.

The company owned four Airbus AS350 B2 helicopters. Three were based in Lihue, and one was based in Hilo. One of the company's helicopters was not in use at the time of the accident because it was undergoing a corrosion inspection on the mainland.

Safari pilots were provided a minimum daily rate of $150, but if the number of hours they flew multiplied by their hourly rate exceeded the minimum daily rate, they were instead paid by the flight hour. Pilots earned much more than the daily minimum for completing a full day of tour flights. A Safari document titled "Company Policy for Pilots" stated that pilots would receive only the minimum daily rate for training, maintenance, and ferry flights.

### 8.1.2 Training Program

#### Overview

Safari Aviation, Inc. had an FAA-approved training program described in a training manual titled *Safari Aviation, Inc. (XSFA) AS-350 Pilot Training Program, Revision 8* (dated August 03, 2016). The pilot training program was applicable to the positions of pilot-in-command (PIC), second-in-command, flight instructor, and check airman. The manual contained training guides for each duty position, training modules for various subjects, a section on required qualification checks, and a collection of training forms. Per Section 3 ("Training Guides") helicopter PICs received 46 hours of initial training. Every 12 months thereafter they received 13 hours of recurrent training. Safari's FAA operations specifications stated that the company was not authorized to make arrangements with training centers and other organizations for certificate holder training in accordance with 14 CFR Section 135.324.

TRAINING METHODS AND COMPLETION STANDARDS stated in part:

Training hour guidelines (found in section 3) represent guidelines for satisfactory completion of each training segment. Nevertheless, actual training time may be greater than these guidelines subject to the individuals pervious experience, complexity of the aircraft and complexity of the type of operation. If a candidate fails to meet any qualification because of lack of proficiency, that candidate must return to requalification training and the HNL FSDO Poi be notified and the applicant is not allowed to do any 135 work IAW 135.301 (b). After retraining, an instructor recommendation is required for reaccomplishing the qualification requirement.

The chief pilot administered pilot training and was responsible for revisions to the company training program. He also received credit himself for training that he provided to the company's pilots, per Section 1 ("General") which stated:

> TRAINING CREDIT FOR INSTRUCTORS
> Ground and flight instructors shall receive training credit in any needed training category for those specific training subjects on which they have given the instruction. The currency of such training credit shall remain in effect for the same period applicable to the duty assignment. Upon expiration of an airman's training currency, recurrent or requalification currency may be accomplished by serving as the instructor of another training session, or by attending another training session as a candidate.

Section 4 ("General Subjects"), Lesson 2 was titled "Federal Aviation Regulations. The course outline for Lesson 2, under the heading "FAR 91 - General Operating and Flight Rules" included the topic "VFR weather." The course outline for Lesson 2, under the heading "FAR 135 -Air Taxi Operators and Commercial Operators", included the topics VFR minimum altitudes, visibility, and VFR weather requirements. The training manual indicated that Lesson 2 was covered during initial and 12-month recurrent training.

Lesson 3 was titled "Meteorology." The objective of this lesson was to "familiarize candidate and test understanding of basic meteorology, recognition of adverse weather conditions, and weather information sources." Under the heading "Materials", the lesson plan listed FAA Advisory Circular AC 00-6 *Aviation Weather*, FAA AC 00-45 *Aviation Weather Services*, and the FAA *Aeronautical Information Manual*. "Elements" included "operations in or near potentially hazardous weather, recognition and avoidance procedures, emergency procedures including inadvertent IMC." The training manual indicated that Lesson 3 was to be covered during initial and 12-month recurrent training.

Section 5 of the manual ("Special Subjects"), Lesson 4 was titled "State of Hawaii -Part 136 and Appendix A". The objective of this lesson was: "Each candidate conducting sightseeing tours in the State of Hawaii will participate and understand the procedures required for Part 136 Appendix A." Under the heading "Materials" this lesson plan listed: "Part 136, Appendix A; Ops Specs & Operations Manual; Procedures Document". The lesson plan for Lesson 4 included the elements "minimum flight altitudes" and "site specific locations, radio, ingress & egress

procedures." The training manual indicated that Lesson 4 was to be covered during initial and 12-month recurrent training.

Section 5 of the manual also included a Lesson 4-a, titled "State of Hawaii - Part 136 And Hawaii Air Tour Procedures Manual Additional Requirements." The objective of this lesson was described as: "Tour pilot candidates will further qualify with the following requirements to conduct a sightseeing tour in the State of Hawaii." Under "Materials" the lesson plan listed: "Hawaii Air Tour Procedures Manual - AWP13-l 36A, Operations Specification & General Operations Manual, other sources of information used to meet requirements of the Air Tour Procedures Manual". Elements contained in Lesson Plan 4-a are listed below:

1. Understanding the difference in Logical Decision Processes versus subtle Unconscious Decision Making Processes
2. Cue-Based Island Specific Weather Condition Decisions
3. Go/No-Go Procedures
4. Weather Enhanced Safety Areas (WESA)
5. Performance Planning
6. Height Velocity Awareness**
7. Mountain Flying & High Density Altitude Techniques Deviation
8. Manual Knowledge
9. Route Knowledge, Aircraft Transition Segments **
10. Preferred Tour Segment-Transition-Path/ Altitudes
11. Noise Abatement/Community Friendly Procedure
12. Site Specific Air Tour Training (each site), emergency landing areas, entry and egress to site specific locations, radio protocol and position reports
13. Raw Terrain Definition
14. Float and Non-Float Over Water Flight Procedures
15. Hawaii Air Tour Accident Review

The double asterisks shown at the end of items 6 and 9 referred readers to a note at the bottom of the page reading: "These Elements are covered in the basic VFR helicopter pilot curriculum. The completion of this additional training requirement will be noted on Training Manual Form Page: 9-1 with 'The individual has satisfactorily completed all the requirements/or Lesson #4-a'." The training manual did not specify how often lesson 4a was required to be completed.

**Cue-Based Weather Training**

The second element in Lesson 4-a "Cue-Based Island Specific Weather Condition Decisions" was the only reference to cue-based training in the company training manual. Safari managers said the only reference material used for the cue-based training was the HATCPM, primarily the pictorial sections of the manual that referenced alternate landing sites, weather enhanced safety areas, maps and guides for deviations, and altitudes to avoid inadvertent IMC encounters. The new director of operations stated that the HATCPM did not "provide simulation guidance as far as putting a pilot into a simulator, and simulating certain scenarios like an AQP

[Advanced Qualification Program], and practicing removal from that." He said cue-based training was, "kind of [a] gray area" because the HATCPM was "not defined as cue-based training", but that the HATCPM was essentially "a cue-based training manual." A review of the HATCPM revealed that it required "cue-based island specific weather" training to be completed during pilot initial and recurrent ground training, and also during requalification ground and flight training. However, the manual offered no details about what cue-based training should include or how it should be delivered. A search of publicly available FAA guidance materials revealed no guidance on how to develop and deliver such training. Safari's POI said that cue-based weather training was something in the HATCPM that had "never really come about."

**Escape from Inadvertent Flight Into IMC**

The company's Part 135 Operations Manual, Helicopter Adverse Weather Procedures, provided the following guidance with respect to inadvertent flight into IMC:

> The use of good judgment, early course reversal, landing, and a high degree of situational awareness will, in most every case, preclude inadvertent flight into IMC. Not every possible circumstance can be anticipated so the possibility does exist for IMC. If a pilot experiences a complete loss of visual reference to the ground the following procedures will apply:
>
> 1. If the pilot is reasonably certain that a course reversal will result in a return to VFR conditions and **RISING TERRAIN is <u>not</u>** a factor, then;
>
> - Level the Aircraft
> - Determine the reciprocal heading
> - Execute a 180-degree turn at a maximum of 20 degrees angle of bank.
> - Maintain altitude until VFR.
>
> 2. If **RISING TERRAIN <u>is</u>** a factor, the following procedures will be applied:
>
> - Level the aircraft
> - Determine an appropriate heading AWAY FROM RISING TERRAIN.
> - Turn to the selected heading at a maximum of 20 degrees angle of bank.
> - Upon completing the turn initiate a climb to an appropriate safe altitude.
> - Communicate your situation. (AIM 6-3-1 & 6-3-2)
> - Contact ATC and get appropriate clearances and follow instructions.

### 8.1.3 Flight Following

There was no FAA requirement for a Part 135 air tour operator to have FAA certificated dispatchers and the company did not employ any. In addition, the director of operations said that the company did not have an employee whose primary responsibility was flight following due to the size of the company. Company employees who staffed the front desk at the company office monitored the radio, responded to transmissions from company pilots, and noted the departure,

arrival, and landing times of Safari flights. Safari's operations manual section L was titled "Flight Locating Procedures." It stated the following with respect to flight operations on Kauai:

> Sightseeing tours will generally begin and end at the Lihu'e Airport. A scheduled stop at an approved landing site has been authorized by the County of Kauai and is FAA approved. The reservation manifest for the flight (with actual departure time notated) will be the primary source for tour flight following. For scheduled landing flights, cell phone or radio communication will update the proposed ETA for Lihu'e Airport. The pilot for a non-tour flight within the island will complete a Company Flight Plan. A FAA Flight Plan will be filed for all inter-island flights. A flight to Ni'ihau, due to the island's proximity will require only a Company Flight Plan.

Section L of the manual stated the following with respect to overdue aircraft:

> Safari personnel monitoring the flight following of an aircraft should consider the aircraft as potentially overdue when the aircraft fails to report inbound prior to the ETA of the aircraft. In which case, the Director of Operations, the Chief Pilot or a designee of Safari at their respective locations will be notified of the lack of the knowledge that the aircraft has safely landed at ETA. If no report of the aircraft is received and the aircraft is more than 10 minutes overdue, a search or query by phone of the nearby airports and with other operators will be made. If an aircraft remains overdue by more than 30 minutes, the FAA Flight Service Station and the Honolulu FSDO will be notified. An overdue aircraft is defined by being overdue more than 30-minutes past its scheduled arrival time.

The manual contained a checklist of tasks to perform and notifications to be accomplished if a flight was more than 30 minutes overdue.

The company operations and training manuals contained no information about training requirements for company flight followers. During a 2021 follow-up interview with the director of operations and the new director of operations who was installed after the accident, company managers told investigators: "We train the flight followers in the FAA approved company flight procedures and strictly adhere to that procedure."

### 8.1.4 Safety Management System

The company did not have and was not required to have an FAA-accepted safety management system, and it did not participate in the FAA's SMS voluntary program. The director of operations stated that the company had developed an SMS 15 or 20 years before the accident that was required by a Department of Defense contract. The director of operations described the system as "very extensive and quite excessive." He stated that the system dealt with "the office… emergency exits… and all kinds of other things that did not really apply to aviation." He said the only element the company had retained since the department of defense contract ended was a mandatory incident/accident reporting and investigation process. He said otherwise SMS at Safari was "very limited". The director of

operations stated that the company did not maintain an SMS due to the size and scope of company.

**Safety Policy**

Safari did not have a company safety policy document signed by an accountable executive. Safari's operations manual, Appendix 1-18, stated the following with respect to how it expected the company's pilots to deal with adverse weather conditions:

> I. CONDITIONS BELOW PART 136 APPENDIX A MINIMUMS.
>
> If the pilot-in-command determines that the weather conditions are below the minimums required by Part 136 Appendix A and the flight is an Air Tour Operation conducted in the State of Hawaii, the flight will be delayed or rescheduled as appropriate. If during the flight, the pilot-in-command encounters weather conditions below the required minimums, he/she will attempt to circumnavigate the adverse area of weather. If avoidance is not feasible the pilot-in-command will discontinue the tour flight and devote full attention to flight duties and safety of flight as required in FAR Part 91 and Part 135. Any deviations will be reported to the Chief Pilot. During periods of adverse weather, pilots-in-command will utilize all available resources to keep informed of changing conditions.

Safari required pilots to sign a "Company Policy for Pilots" form (dated 2009) that was not included in company manuals. The director of operations told investigators he developed this form to ensure pilots understood how he expected them to fly tours. A copy of the form provided to investigators was signed by the accident pilot on July 12, 2011. The introductory paragraph, "Background", stated:

> Safari has grown beyond a simple tour company over the last 20 years. The company established the reputation as a safe, reliable sightseeing tour operation. On occasion, we receive request for a "thrill ride" and it is always declined. If the customer wants a "thrill ride" they can always go to the many theme parks on the mainland and enjoy multitudes of thrills to their hearts content. As the company grows and expands, clarification needs to be made to all pilots on how this company conducts its flights.

The company policy for pilots included the following statements about pilot weather-related decision making:

> A quality tour is very subjective. This company would prefer that a pilot reschedule a flight when the weather is not only questionable to FAA standards but is questionable as to quality to the passenger. Under what two circumstances do we make a determination as to weather rescheduling?
>
> a. One, under obvious circumstances when the pilot cannot be in compliance with FAR's.

b. Two is more subjective. Our ad's state that our tours may vary "weather permitting". However, if a certain area that is critical to the tour is not accessible due to weather conditions and a good portion of the tour is still accessible but with a flight pattern change, a pilot should inform the staff of "passenger's choice". Give a plausible explanation of what they might or might not see and if the weather is "up and down" and or if it is not predictable. If a great deal of the tour is marginal and below regulatory minimums then the pilot should reschedule on his own volition.

c. For Kauai: Keep in mind, passing rain showers may only last 10 to 15 minutes. If the island, as a whole, is not in compliance with regulations then flights are rescheduled.

   If the weather prevents 50% or more of the island from a tour, the pilot may reschedule, but if the passengers want a modified tour and the pilot can determine that the modified tour still meets minimums, then it is possible for a "passenger's choice". A modified tour will take place to show the passengers as much of the island that is legally possible and if a tour cannot be completed in the allocated time frame, then the flight time will be prorated and the pilot will inform reservations as to the total flight time flown.

   Once the pilot makes the decision based upon the above criteria and reservations is informed by radio, the passengers do not need to be briefed again at the flight line prior to the next flight unless the pilot knows for certain that weather is deteriorating rapidly and that his prior analysis has changed.

4. The staff has the burden of dealing directly with the customers. Some can be very irate and some can be very congenial. The pilots generally do not have to deal with these customers, however, on occasion; the staff may need your assistance in explaining the weather.

In 2019, Safari placed an air tour advertisement in a publication called the Kauai Drive Guide Vacation Planner (issue dated December 2019-May 2020). The advertisement stated, “It’s Not Just a Tour, It’s an Adventure in Paradise.” The advertisement also stated:

> [The director of operations] wants Safari passengers to fully enjoy their adventure, but he considers safety of the utmost importance. He holds to the axiom, ‘there are old pilots and there are bold pilots, but there are no old, bold pilots,’ and he requires that all of his pilots adhere to the same high standards of professionalism that he personally carried out over the years.

A note at the bottom of the advertisement stated that tours varied depending on the weather.

**Safety Risk Assessment**

Flight risk assessment was addressed in Safari’s operations manual, section C, “Operational Control”. The introductory paragraph to that section stated:

> More than 90% of SAFARI AVIATION, INC. business is a basic Part 91 tour operation. The minimum safety for it's tour operations is significantly regulated under Part 91 and Part 136.
>
> When SAFARI AVIATION, INC. is required to operate as a Part 135 organization, SAFARI AVIATION, INC. will continue to follow the Operational Control requirements set forth under the company's GOM, Section A008 – OPERATIONAL CONTROL.

According to the manual, these operational control requirements included "all of the company mandated procedures and requirements for the release of the flight have been met." Among the mandated procedures listed was the following:

> 9. Prior to any Part 9l or 135 flight, or series of flights by SAFARI AVIATION. INC. the operation will be assessed a risk value established with SAFARI AVIATION, INC.'s Risk Assessment Program. (see Appendix)

A document titled Rotor Wing Aircraft Flight Risk Assessment Value (RAV) Tool (dated November 1, 2008) was included in an appendix of the operations manual (figure 17).

**Rotor-Wing Aircraft Flight Risk Assessment Value (RAV) Tool**

| |
|---|
| **LOW RISK HAZARD EVENTS** |
| • No LOW RISK EVENTS exceeding parameters and occurring simultaneously with another LOW RISK EVENT being exceeded. |
| • Weather within Part 136 Air Tour VFR Standards |
| • Completed mission planning & preflight within 1 hour before ETD. |
| • Sustained winds are less than 22 knots with gust spread no greater than 5 knots |
| • Aircraft status is normal for flight |
| • PIC is qualified for the mission and current |
| • PIC has flown aircraft category within last 30 days. |
| • Special VFR Flight not anticipated |
| • Less than 7 hours anticipated total flight time for the day. |
| • No night operations anticipated |
| **MEDIUM RISK HAZARD EVENTS** |
| • Two or more LOW RISK EVENTS exceeding parameters & occurring simultaneously |
| • Two or more MEDIUM RISK hazards occurring simultaneously. |
| • Forecasted severe turbulence |
| • Vis marginally 3 miles over land / Ceilings marginally 500 ft AGL over WESA |
| • High surf warning in the vicinity of off shore operations |
| • Forecast scattered thunderstorms (10-50% probability). |
| • Greater than 8 hours flight time. |
| • Night operations with off airport landing. |
| **HIGH RISK HAZARD EVENTS** |
| • Three or more HIGH RISK hazards occurring simultaneously. |
| • Forecasted SIGMET turbulence. |
| • Forecasted severe thunderstorms |
| • Marginal VFR |
| • Known icing conditions. |
| • Weather observer at destination site unavailable |
| • Driving impaired by weather |
| • Flooding conditions forecasted |

**Figure 17: Rotor-Wing Aircraft Risk Assessment Value Tool**

The following page of the appendix stated the following with respect to the RAV tool and flight release authority:

> Any risk hazard events EXCEEDING the parameters of a HIGH RISK HAZARD EVENTS will be classified as EXTREMELY HIGH RISK.
>
> Weather conditions are historically in constant flux. Operations will be diligent to the observation of the changing local weather conditions and evaluate each flight on a flight to flight basis.

The appendix included the following table describing flight release authority by level of assessed risk:

| Flight Risk Hazards | Authorized PIC | Chief Pilot | Dir of Ops &/or Dir of Maintenance |
|---|---|---|---|
| LOW RISK | X | Chief Pilot Aware of Flight | |
| MEDIUM RISK | X | X | |
| HIGH RISK | | X | X |
| EXTREMELY HIGH RISK | | | Requires Consultation between A/C Cdr, Chief Pilot, Dir of Ops & Company President |

**Table 2. Safari flight release authority by level of assessed risk.**

During a post-accident interview, Safari's director of operations was asked to discuss the company's use of the RAV tool. He stated:

> Basically if we're doing a sightseeing tour which is routine, it's the process of determining what the weather's like before we take off. It's the process a pilot determining -- the pilot in command determining what the weather's like throughout the day and whether we continue to fly or not. The process of risk analysis is based upon doing charter work that we're not familiar with and/or anything else that is not in a normal tour operation. From a tour point of view, risk and management has been done just doing tours from the get go. If we do something out of the ordinary, that is not part of the sightseeing tours, then we go through the process of risk analysis of that.

Asked whether the company recorded risk values generated using the RAV tool, he said, "We don't hardly ever do that. We hardly ever do anything outside our daily sightseeing tours. It's extremely rare to do a charter." During a subsequent interview, the director of operations said, "Basically we're on low risk for doing tours."

The director of operations was asked how Safari pilots performed enroute risk assessments when they were operating a tour flight, and he stated the following:

> The PIC is the only one in the air, who can make that determination. Nobody, chief pilot, director of operations, office staff or anybody else can make that determination. The PIC sees what the weather is like. He makes the decision, okay, I'm coming back, flights are cancelled, I'm varying my flights or we continue with the flights. He's the only one that can make that assessment. There's nobody else in the cockpit.

He stated the following additional information with respect to pilot in-flight assessment of weather-related risks:

> We pull down the weather from the National Weather Bureau to start with, and it's reviewed and signed by the pilot the first run of the day. Thereafter, the pilot uses his judgment and/or PIREPs to determine what the weather is like while he's enroute. Like I said, nobody but the pilot can make that decision when they're doing a tour. Nobody else has actual knowledge or visual reference to anything at that point in time; only the pilot will know what's going on after the first weather brief he gets in the morning

The director of operations stated that the company tried to mitigate weather-related risks for pilots who were new to Hawaii by applying more stringent weather minimums to their flights for the first year they were employed by the company.

**Safety Assurance**

As previously stated at the beginning of this section, the director of operations stated that Safari had a mandatory accident/incident reporting and investigation process. He stated that the company required pilots to fill out such reports if they had "circumstances that need to be reviewed." He said management would review any such reports, look for trends, and determine if corrective actions were needed. He described two examples, one involving an autopilot "going off", and another involving a rotor strike. NTSB investigators asked two of Safari's pilots whether the company had a safety reporting system. Neither was aware of the existence of a company safety reporting system.

The director of operations stated that he told pilots that the company reviewed tour videos on a periodic basis to verify that they were "flying according to what we expect them to be doing." He said the company checked the videos periodically to ensure pilots were flying in compliance with the company's deviation authority. The director of operations stated that the chief pilot (the accident pilot) was primarily responsible for doing this. The director of operations said he did not know how often the chief pilot reviewed the tour videos. He thought the chief pilot might have only looked at the videos if he found that a pilot was using excess fuel during standard length tours, which would raise concern about "hot dogging" or pulling excess power. He further stated:

> We quite frequently pulled videos for just randomized compliance issues, for customer complaints, for camera quality. They were always being monitored as

well as every single video was monitored by the front desk staff for video quality before it was given to the customer. Now, obviously, they are not, you know, the front desk staff are not versed in FAA compliance or company policy and procedures, but any adverse or abnormal flight conditions would have been immediately reported to us at that time.

**Organizational Safety Culture**

The director of operations said that he and chief pilot told all of their pilots, especially new ones, that if they were asking themselves whether or not they could fly somewhere, they had already answered the question for themselves. They should fly somewhere else. Safari's primary pilot, who had been with the company for two years, said he believed it was his decision whether to accept a flight. He thought there might be some management or peer pressure to fly at other tour companies. He had never felt management pressure to accept a flight that he preferred to decline, and he was often flying alone, so he experienced no social pressure either. Safari's Sunday secondary pilot had worked for Safari for about 24 of the previous 27 years. He felt that the pilot in command was in charge of flight-related decision making. He also stated that he had never felt any management pressure to fly, and he said that he had never had to defend a decision to decline a flight. He stated, "They hire us. They train us. They expect us to do what is safe and legal and responsible. They can't be out there with us. So they expect us to use our judgment." He added, "…in all the years I've been flying here I don't think there's a better group of guys. The safety culture compared to what it was say 25 years ago, hotdogs don't last here. And I think the newer pilot coming up is a lot more safe than they used to be. I honestly believe that."

### 8.1.5 Company Attendance at Hawaii Air Tour Safety Meetings

Safari's operations specifications stated that Safari, like other Hawaii air tour operators, was required to attend an annual air tour safety meeting. Safari's operations specifications stated that the purpose of the safety meetings were to "discuss safety trends and Part 136, Appendix A issues…" Company records showed that five Safari pilots attended the Kauai Air Tour annual safety meeting in 2019. The director of operations stated that operators developed the agenda and presented during these meetings. He said he found the meetings valuable for sharing of experiences. He thought FAA attendance at such meetings was helpful for answering any questions about FAA regulations.

### 8.1.6 Company Changes After the Accident

During a September 15, 2021, follow-up telephone interview with the president / director of operations, a new director of operations who had been appointed to that position after the accident, the managers told investigators that Safari had been shut down for much of the previous year due to the COVID-19 pandemic. As the company was beginning to reopen, it had one pilot and three helicopters on their Part 135 operating certificate. At the time of this call, however, one helicopter was in operation and two were undergoing heavy maintenance.

Since the accident, the company had installed ADS-B transceivers with in and out capability in all three helicopters. The new director of operations stated that the reason was so the company could use ADS-B for "monitoring the location of the aircraft in real time for safety." He stated that Safari was able to monitor its flights from Lihue, but this capability was limited because mountainous terrain blocked ADS-B transmissions from some parts of the island. Specifically, Safari could not track its helicopters from the time they passed Upper Microwave until they reappeared in an area south of Hanalei. This meant the helicopters could not be remotely monitored for about 15 to 20 minutes during each tour flight.

Safari had changed their approach to compensating pilots after the accident. The new director of operations stated that the new compensation arrangement provided a monthly minimum salary that was enough to cover pilots' housing and other basic needs, and that this salary was supplemented by additional flight hour pay.

In addition, Safari had developed a flow chart describing the company's flight following practices and included it in a revised version of the company's operations manual (figure 18).

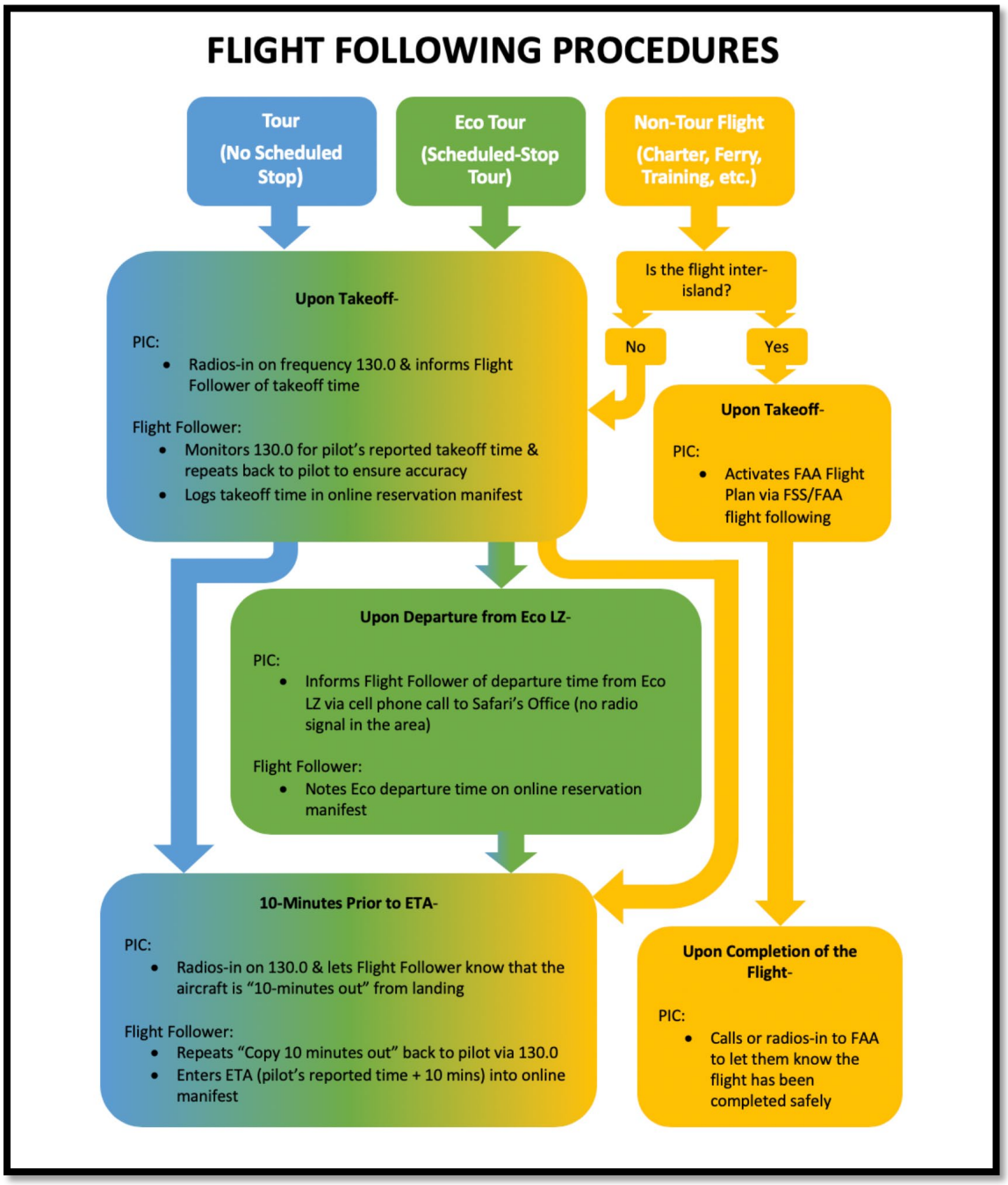


**Figure 18. Diagram of company flight following practices.**

## 8.2 FAA Oversight

### 8.2.1 Visibility and Altitude Requirements

Parts 135 and 136 specified minimum visibility and altitude requirements that were applicable to air tour flights operated by Safari. Part 135.205, VFR: Visibility Requirements stated the following with respect to minimum visibility.

(b) No person may operate a helicopter under VFR in Class G airspace at an altitude of 1,200 feet or less above the surface or within the lateral boundaries of the surface areas of Class B, Class C, Class D, or Class E airspace designated for an airport unless the visibility is at least –

(1) During the day - 1/2 mile; or
(2) At night - 1 mile.

Part 135.203, VFR: Minimum Altitudes specified the following minimum altitude for flights operated under 135:

Except when necessary for takeoff and landing, no person may operate under VFR-

(b) A helicopter over a congested area at an altitude less than 300 feet above the surface.

Part 136, Commercial Air Tours and National Parks Air Tour Management, Appendix A, Special Operating Rules for Air Tour Operators in the State of Hawaii, listed the following additional minimum altitude requirements:

Section 1. Applicability. This appendix prescribes operating rules for airplane and helicopter visual flight rules air tour flights conducted in the State of Hawaii under 14 CFR Parts 91, 121, and 135.

Section 6. Minimum flight altitudes. Except when necessary for takeoff and landing, or operating in compliance with an air traffic control clearance, or as otherwise authorized by the Administrator, no person may conduct an air tour in Hawaii:

(a) Below an altitude of 1,500 feet above the surface over all areas of the State of Hawaii, and,
(b) Closer than 1,500 feet to any person or property; or,
(c) Below any altitude prescribed by federal statute or regulation.

### 8.2.2 Operations Specifications Requirements

Flight Standards Information Management System, Volume 3, Chapter 18, Section 1, Operations Specifications – Background Information, stated that operations specifications were needed to establish and administer safety standards to accommodate many variables. These variables included: a wide range of aircraft, varied operator capabilities, various situations requiring different types of air transportation, and the continual, rapid changes in aviation technology. The document stated that it was impractical to address these variables through the promulgation of safety regulations for every situation and set of operator capabilities and that it was also impractical to address the rapidly changing aviation technology and environment through the regulatory process. The document stated that operations specifications made use of standard templates developed by the FAA Flight Standards Service, and that occasionally non-standard templates were used to accommodate potentially relevant variables. Safari Aviation Inc.'s

Operations Specifications, Section B048, Air Tour Operations Below 1,500 Feet AGL in the State of Hawaii, stated:

> The certificate holder is authorized to conduct Title 14 Code of Federal Regulations (14 CFR) Part 135 commercial air tour operations at an altitude of less than 1,500 feet above the surface, within the state of Hawaii, in accordance with the provisions and limitations set forth in this operations specification.
>
> (I) The certificate holder is authorized to conduct commercial air tours on the following islands and must comply with the Hawaiian Air Tour Common Procedures Manual, as revised, for Flight Below 1,500', dated 08/15/2008, revision number I:
>
> Appendix A - Island of Hawaii, dated 08/ 15/08, revision number I
>
> Appendix F- Island of Kaua' i, dated 08/ 15/2008, revision number I
>
> (2) The certificate holder shall ensure that each pilot participates in at least one (1) formal commercial air tour safety meeting each 12 calendar months to discuss safety trends and Part 136, Appendix A issues in accordance with the following limitations and procedures:
>
> (a) A 10-day advance written notice, with an agenda, of each formal air tour safety meeting must be sent to the Honolulu Flight Standards District Office.
>
> (b) If the pilot is unable to attend the meeting, the certificate holder shall provide the pilot with a review of the issues and relevant safety discussions that transpired within 30 days after returning to duty.

### 8.2.3 Hawaii Air Tour Common Procedures Manual Requirements

The HATCPM stated the following additional information with respect to the operation of air tours below 1,500 feet above ground level (AGL) in the state of Hawaii:

> All commercial air tour operators, authorized to conduct operations below 1,500 ft. above ground level (AGL) within the state of Hawaii, must comply with the requirements and limitations set forth in this manual.
>
> All commercial air tour operators must:
>
> 1. For part 135 commercial air tour operators, the certificate holder must first apply for, and receive operations specification B048, prior to conducting operations below 1,500 ft. AGL. For part 91 commercial air tour operators, the operator must first apply for, and receive a Deviation Authorization, prior to conducting operations below 1,500 ft. AGL.
>
> 2. Prior to conducting commercial air tour operations below 1,500’ AGL, pilots must receive operator specific training, as outlined below:

| Module | Initial Ground Training | Initial Flight Training | Recurrent Ground Training | Recurrent Flight Training | Initial Flight Check | Recurrent Flight Check | Requalification | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Ground | Flight |
| Mountain Flying Techniques, High-Density Altitude | X | X | X | X ** | X | X | X* | X* |
| Performance Plans | X | X | X | X ** | X | X | X* | X* |
| Cue-Based Island Specific Weather | X | | X | | | | X* | X* |
| Go/No-Go Procedures | X | X | X | X ** | X | X | X* | X* |
| Route Knowledge, Aircraft Altitude Transition Segments | X | X | X | X ** | 1 route segment | 1 route segment | X* | X* |
| Deviation Manual Knowledge | X | X | X | X ** | X | X | X* | X* |
| Hawaii Air Tour Accident Review | X | | X | | | | X* | X* |
| Site Specific Tour Training (each site), emergency landing areas, entry and egress to site specific locations, radio protocol and position reports. | X | X | X | X ** | 1 route segment | 1 route segment | X* | X* |
| Weather Enhanced Safety Areas (WESA) | X | X | X | X ** | X | X | X* | X* |
| Height Velocity and Raw Terrain Descriptions (Helicopter only) | X | | X | | | | X* | X* |

3. Special VFR departures are prohibited.

4. No commercial air tours permitted during night (night as defined in FAR Part 1) below 1,500 ft. above ground level (AGL).

5. Visibility Restrictions: For flight below 1,500 ft. commercial air tour flights must maintain 3 statute miles over land, including transition areas. 1 statute mile over offshore transition routes.

6. Additional airplane air tour restrictions: All altitudes below 1,500 ft. feet AGL shall be conducted at an altitude +500 ft. above the altitudes listed for helicopters.

The HATCPM Appendix F, Island of Kaua'i, contained the color-coded map of Kauai reproduced in figure 19. It also provided the following map legend:

Yellow Highlighted Areas-

1. An area that allows for helicopter operations at, or above, 500 ft. AGL.
2. An area that allows for airplane operations at, or above, 1,000 ft. AGL.
3. Razorback ridges may be crossed by helicopters at an altitude of no less than 200 ft. AGL.
4. Helicopters must maintain a standoff distance from raw terrain of at least 300 ft.

Clear (no highlight) –

1. An area that allows helicopter operations at, or above, 1,000 ft. AGL.
2. An area that allows for airplane operations at, or above, 1,500 ft. AGL.

3. Razorback ridges may be crossed by helicopters at an altitude of no less than 200 ft. AGL.

Pink Highlighted Areas-

15. An area that allows operations only at 1,500 ft. or above for both helicopter and airplanes.
16. Razorback ridges may be crossed by helicopters at an altitude of no less than 200 ft. AGL.

Black □: Site Specific Areas:

1. Sorted by Island and Listed by Name.
2. Identified on each map and listed identified by latitude and longitude.
3. Site specific training must be completed prior to conducting operation in this area.
4. Operational requirements and restrictions must be adhered to when operating in site specific areas.
5. Site specific areas begin at, or above, 500 ft. AGL and up to and including 999' AGL within the identified site specific location. (300 ft. AGL and up to and including 999' for multi-engine helicopters with single-engine fly-away capabilities)

Area defined by Dashed Lines (- - - -): National Parks or National Park Units:

1. An area that requires commercial air tour operator, as defined by 14 CFR 136, to be in possession of Interim Operating Authority (IOA) or Operating Authority (OA), once an Air Tour Management Plan is developed, prior to conducting commercial air tour operations. This area extends ½ mile outside the national park / park unit boundary line from the surface to 5,000' AGL.
2. Until such time as an ATMP is developed, commercial air tour operations may not be conducted at an altitude of less than 1,500' AGL, unless otherwise highlighted pink, yellow, or is clear (see map legend for altitude limitations for aforementioned colors). Green highlights are only used to help identify national park or national park / unit land.

In-flight deviation authority requirements:

A) The pilot in command of an aircraft is directly responsible for, and is the final authority as to, the operation of that aircraft.
B) If an in-flight deviation requires immediate action or deviation of any of the requirements set forth in this manual, the pilot in command may deviate to the extent necessary to meet that circumstance.
C) Each person who deviates from the regulations and/or requirements set forth in this manual shall contact the Principal Operations Inspector or Flight Standards District

Office Manager within 10 days of such deviation and if so requested, file a written report.

Site Specific Emergency Landing Area: When an operator conducts a commercial air tour over a popular site (site specific location) at or below 1,000' feet above ground level, the pilot should have a predetermined emergency landing area that was pre-approved by the Administrator. This is only required at site specific sites for single engine or multiengine helicopters that do not have the performance to fly away to a safe landing area when an engine failure occurs.

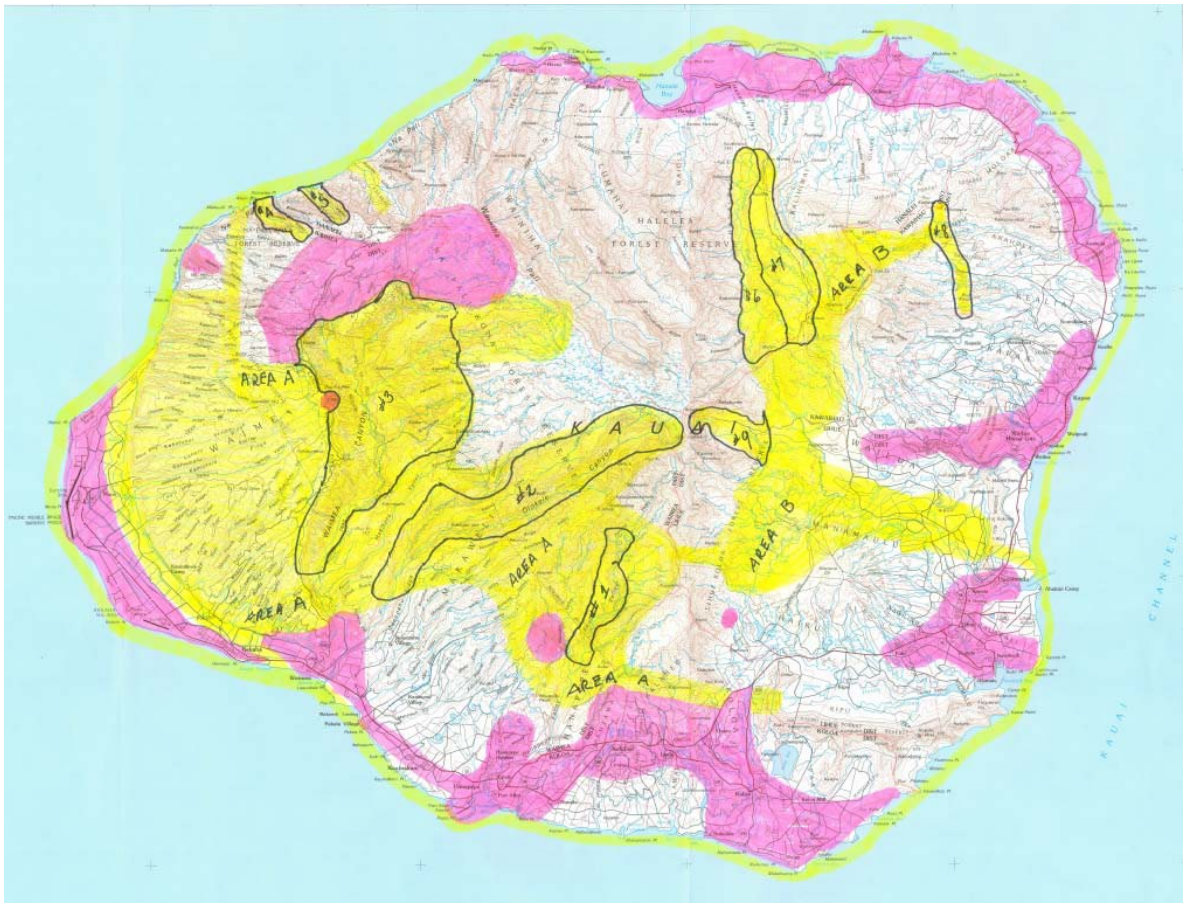


**Figure 19: Color-coded map of Kauai in Appendix F of the HATCPM.**

A section of the HATCPM Appendix F, Island of Kaua'i, titled Weather Enhanced Safety Areas presented an identical copy of the color coded map of Kauai shown in figure 19 and provided the following additional information about the color coding of the map:

The attached Kauai topographical maps contain areas "highlighted" in YELLOW. These "highlighted" areas are designated 500 feet AGL "weather enhanced safety areas" (WESA) intended to increase the pilot's options for selecting safe routes through areas of weather. When operating below 1,500 feet AGL the pilot shall

have a suitable emergency landing area within power off gliding distance at all times.

Areas highlighted in PINK are 14 CFR Part 136 Appendix A applicable, and have no deviation. (1,500 feet AGL required)

Non - highlighted map areas are 1,000 feet AGL (minimum) transition areas.

Areas highlighted in YELLOW are Weather Enhanced Safety Areas. (500 feet AGL allowed)

### 8.2.4 Flight Standards District Office Oversight of Air Tour Operators

A previous Honolulu FSDO manager (2013-2016) stated that the Honolulu FSDO had the largest geographic service area of all FAA FSDOs, and oversaw general aviation in the Hawaiian Islands, Guam, Yap, American Samoa, Mariana Islands, Philippines, and Japan. She estimated that air tour oversight comprised about 30-40 percent of FSDO activity during her tenure. Air tour accidents were down when she became the Honolulu FSDO manager in 2013. There had been no accidents in 2012. After 2012, there had been some, but the accident rate had stayed low. One had occurred in 2013, but the passengers survived. Two had occurred in 2014, at least one of which involved no injuries. One in 2016 had resulted in serious injuries. FSDO staffing had included five to six operations inspectors and eight or nine maintenance inspectors during her tenure. Turnover was not excessive, and she was able to backfill positions before inspectors left for other jobs.

The previous FSDO manager said that under her leadership the FSDO had emphasized air tour safety, asserting:

> …we really, really tried to ramp up what was put in place before me in the way of surveillance… since 2008, Hawaii still had the most regulated air tour environment in the country, and we really concentrated on it hard. So we involved the Hawaii Helicopter Association. I know they started up in 2017, but we started working with all of the operators. And I think, during the 3-year time span, there were only about 10 operators or 10 significant ones… And we had already implemented the fly neighborly programs and constantly communicated that with the operators who flew multiple flights. And then we asked them again to voluntarily reduce the noise because we were getting a lot of noise complaints at that time.[22]

The previous FSDO manager said that both industry outreach and surveillance were needed to improve air tour safety. She thought it was important to have the industry help because everything could not be surveilled. During her tenure, the Honolulu FSDO had implemented an annual safety conference at the Honolulu Airport. They had also held a meeting two or three times a year where operators could discuss ideas amongst themselves, and the FSDO would participate in implementing them. For the first year or two of her tenure, the FSDO had a "ghost rider" program where FAA inspectors purchased tickets and conducted surveillance on air tour

[22] Interview K.C. Yanamura.

flights while posing as passengers, however the FSDO discontinued that program when the FAA began to implement SMS. Asked whether the FSDO had used ADS-B to verify whether operators were following the routes and altitudes prescribed in the HATCM, she said she thought the operations inspectors had done that.

The previous FSDO manager was asked what she had regarded as the highest area of risk for the Hawaii air tour industry during her tenure, she said that the FSDO had prioritized surveillance of new operators, operators that had not been visited by the FAA within a certain time period, and operators that had experienced accidents or incidents. Beyond that, she left it to the operations inspectors to tell her "if they felt something was critical." The operations inspectors had no problem coming to her, and were "pretty vocal." Asked how concerned the FSDO was about the potential for VFR into IMC accidents during that time, she said the level of concern was "pretty high." They had sought funding for an Alaska-style weather camera project to mitigate that risk. They had received approval for that, but the FAA had not yet implemented the weather camera program by the time she left. Asked whether the FSDO had been involved in helping operators implement cue-based weather training for Hawaii air tour pilots, she said yes, the FAA had implemented "some tech training, and some videos were developed for Hawaii flights."

A former operations inspector who had worked at the Honolulu FSDO from 1996 to 2015 and had served as POI for Safari in the past was asked what he thought would be the most effective FAA strategy for reducing weather-related air tour accidents in Hawaii.[23] He said it was important to focus on training pilots to avoid flying into IMC at all costs, and gearing up the enforcement system to ensure pilots were doing so. He stated, "We need to make the guys scared of what's actually dangerous." He stated that it would be useful to present realistic depictions of weather during training. He stated that operators were required to discuss their past accidents in training, but he did not think Safari had had any. He thought it would be valuable for operators to cover in training other air tour accidents that had happened in Hawaii. He also thought it might be useful to provide scenarios during check rides that required pilots to say they would turn around if the weather deteriorated.

The FAA employee who held the position of Honolulu FSDO manager at the time of the accident said she accepted that position in 2017.[24] She said she received no in-briefing from the previous manager because the previous manager had already left the FSDO. She stated that there had been some employee turnover at the FSDO since 2017, particularly among the operations inspectors. Based on their complexity numbers, the Honolulu FSDO was supposed to have six operations inspectors but at the time of the accident the FSDO had only two fully trained inspectors, with another two who had been hired in late 2019 and were still in training. Workload for the operations inspectors was "extremely high" at that time. The FSDO was in the process of increasing their inspector staffing to better balance the workload, but staffing had been a significant challenge for the FSDO manager. She stated that it was difficult to hire because Hawaii was disconnected from the continental U.S. and the state had a high cost of living. At the end of 2018, the FSDO determined that they were unable to manage all of the certificates in their

[23] Interview Dave Ryon.
[24] Interview Tiffany Chitwood.

region, so the FAA division office that oversaw the FSDO transferred some certificates to another FSDO that had the resources to oversee them.

The FSDO manager stated that the FSDO's approach to overseeing air tour operators had not changed in recent years. She said that the frequency of inspector interactions with an air tour operators was based on the risk level that the inspectors determined for those operators. Asked to comment on some inspector statements made during NTSB interviews indicating that some inspectors had experienced difficulty obtaining travel funds or permission to perform in-person surveillance on Kauai during the fall of 2019, she said she had heard that, but to her knowledge the FSDO had not denied any travel requests in their computerized E2 travel system. Asked whether there had been any verbal denials of travel, she said she could not recall. Inspector requests for travel went to their front-line managers. Asked whether inspectors could travel to Kauai on airline jump seats, she said there would have to be an entry in the work program database showing that the airline had requested FAA oversight work. Her office was not assigned to oversee any Part 121 airlines, so an air tour POI would have to purchase an airline ticket. Asked whether she encountered difficulty with funding for inspectors to travel to other islands to perform surveillance in 2019, she said she did not recall any such difficulties.

Asked what air tour industry risks the FSDO had been most focused on monitoring or addressing during her tenure, she stated that she could not think of anything except for an effort to update the HATCPM. The FSDO manager was asked what types of Hawaii air tour accidents had led to the most fatalities over the last decade or two, and she said she could not speculate. Asked if there had been any common causal factors, she said she would have to "go back and look at forms." Asked how past air tour accidents in Hawaii and related NTSB safety recommendations influenced the FSDO's approach to overseeing air tour operators, she said some safety recommendations had been incorporated into the HATCPM. She stated that one of those recommendations was the holding of an annual air tour operator safety meeting. Asked whether she knew if those meetings had occurred in 2019, she said she would have to go back and look at the records for each operator because the FAA did not participate in those meetings. Asked for her opinion about the most effective strategy for reducing the risk of weather-related air tour accidents, she said it would take her some time to research that question.

The FSDO manager was asked if she had been briefed on oversight activities pertaining to Safari in the year before the accident, and she said that she was sure Safari had been discussed, however she could not provide specifics. She said that, aside from the accident, there had been no notable issues with Safari.

A former front-line manager who served in that position at the Honolulu FSDO from 2007 to October 2019 said he thought operational oversight of Hawaii air tour operators had been more aggressive in 2007 compared to how it was in 2018 and 2019.[25] He said that around 2016, the FAA had transitioned from a system for organizing surveillance called the national program guidelines (NPG) to a system called the safety assurance system (SAS). He thought SAS was better geared toward large operators, but it was a cumbersome tool for surveilling small

[25] Interview Curtis Whaley.

operators. He stated that travel to visit operators was pretty much "set in stone" under the old system, but after SAS was phased in, inspectors had gradually begun to cancel or terminate their inspection items because it was easier to do that in SAS than it had been under the NPG. Travel became less common, and when they did travel, they had to justify to the FSDO manager why they were going, in terms of operator risk. If they had had no recent findings for a particular operator, travel could be denied.

The former front-line manager said that in the past, inspectors had been able to jump seat to the other islands for the day to perform surveillance, but in recent years the FAA division manager who oversaw the Honolulu FSDO had disallowed use of the jump seat unless they had an inspection to perform in the cockpit. Following that change, they were required to buy tickets to travel to the outer islands to conduct in-person surveillance. In 2019 the FSDO had also given up the government car it had previously kept on Kauai.

The former front-line manager thought the previous FSDO manager had been more amenable to listening to inspectors, whereas the current FSDO manager often had her door closed and was inaccessible. He felt having an inspector visit an operator was valuable from the standpoint of ensuring compliance. The FSDO had previously had a group dedicated to air tour surveillance, but it had been disbanded several times.

The former FAA front-line manager was asked what he thought would be the most effective FAA strategy for reducing weather-related Hawaii air tour accidents. He stated:

> Well, again, I think it goes back to FSDO presence, inspector presence in the air operators. And I think the advent of being able to install weather cams would be a real good plan, but that never came to fruition. At least it hasn't as of now that I know of. I think mere presence means an awful lot, having somebody there just doing -- even if it's routine surveillance, and even if there are no findings, just the operator knowing the FAA is going to be there, and the FAA being there, is a very positive deterrent to noncompliance.

The former front-line manager was asked about past FAA participation in annual air tour safety meetings. He said an operations inspector had been actively involved in the meetings in the past, but the FSDO had stopped participating in the meetings after that inspector left around 2015 or 2016, because FAA involvement was not required.

A former FAA inspector who had joined the Honolulu FSDO in 2008 and served as the POI of safari from 2014 to 2018, with a break in 2015, did not recall identifying any violations on Safari's part.[26] He stated that the FAA's approach to overseeing 135 operators had shifted to a "compliance philosophy" during his tenure. He thought this change was positive, stating:

> ...once the operators found out that we're not the black hat FAA that's out to violate them every chance we could get, they would open up more, and they'd be much

[26] Interview Don Andera.

> more willing to talk to us about things. And if there was a problem or issue they had, they would mostly identify it to us, and then we could just fill out a counseling statement, or they'd make out a -- you know, kind of a letter of correction for what they found. And that information back and forth was beneficial, and it just helped with the basic rapport that we had with the operator.

He also stated, "I can't say that that helped the surveillance that much. We would put our focus into the entries into the computer, and I don't know if we had as much actual legwork then to do observation." He stated that another challenge during that period was that "inspectors kept leaving", workload was high, and it was "hard to do any additional surveillance other than the minimum requirement." He stated that the new requirement for inspectors to buy tickets to travel to the other islands made it "less convenient... to go through that type of surveillance." Asked how, during his time as POI for Safari, inspectors monitored whether air tour operators were complying with minimum weather requirements, he stated:

> ...it would be hard for us to even make sure we monitored that. Because the weather conditions would change quite often, and so without sitting at the airport 24/7, it would be hard to monitor exactly if they were or were not. It would just be by chance if we would happen to be there and the weather was bad, but generally those days -- if the weather was bad, I wouldn't want to go, because if I was there visiting, I was probably giving a check ride or something somewhere on the island, and so you're looking for a little better weather. I can't say that we went there on the bad weather days to see if anybody was flying.

The former inspector was asked to describe air tour hazards in Hawaii, and he stated:

> I guess typical hazards for the air tours around Hawaii, one of the hazards would be a lack of landing sites. The terrain in Hawaii is probably quite unforgiving once you get away from the limited level ground because it's quite mountainous, it can be tree covered, the coastlines can be quite rocky, and then you've got the ocean. So that's one of the hazards is having a lack of good forced landing areas… And I guess the other hazard would be you could have rapidly changing weather conditions. So the weather patterns in Hawaii, you have a lot of physical uplifting as the trade winds hit the mountains, and so every day you're going to run into rain showers possibly somewhere along the route. And that's going to be changing so that it might be good on one island or one part of the island where it's clear blue, and then as you're continuing the tour, you could run into really nasty weather conditions... And then also, with the lack of weather conditions, is a limited amount of nav aids or IFR ability in front of the areas and not -- very limited radar coverage in some of the areas, too.

Asked how he thought the air tour safety could be improved, he stated:

> I don't know how, how it could be improved, because it seems a lot of it has to, has to happen at the pilot. Where the rubber meets the road, I guess, how that pilot

> responds to the changing weather conditions and what tools will help that, whether that's changing that pilot's attitude or -- I can't tell if it's increasing. Any type of equipment would help. I don't know. That's a judgment call of the pilot at the moment he's seeing the weather as to what he's going to do, and that's a hard piece to try and control.

Asked to describe the best way to prevent air tour VFR flight into IMC, he stated:

> The best way, in my opinion, I guess would be to have -- even if you have strict weather guidelines, it's all going to boil down to that pilot who's out there at the time and his ability to monitor the changing situation and his ability to not feel any pressure to terminate the flight and either return to base or land if you can't return to base. So it's -- I guess the best would be is an attitude, just -- and as far as somebody would have that attitude, I would consider [the accident pilot] having that attitude, which is kind of ironic that he's the one that got caught. But I guess it's basically the climate in the company, the attitude of the pilots, and the attitude of the director of ops and the owner of the company.

Safari's current POI had worked at the Honolulu FSDO since 2009.[27] He had served as Safari's POI from 2015-2016 and from April 2019 until the time of the accident. He said that when he began working at the FSDO, there was a geographic surveillance unit, an air tour surveillance unit, and an airworthiness unit. These three units had a "traveling road show", an annual safety meeting they put on for the air tour operators. Due to a decreasing number of inspectors employed at the FSDO, the FSDO had offloaded the responsibility for organizing this safety meeting to the air tour operators. The POI also stated that when he first started at the FSDO, the geographic unit inspectors would go out to remote areas of islands to surveil how the air tour pilots were flying. As time went on, the geographic unit was disbanded, and the remaining inspectors did not have time to go out in the field "just looking for this stuff."

The POI said that he tried to monitor what air tour pilots were doing by keeping an eye on other aircraft when he was conducting check rides. If he saw another aircraft get too close to weather, he would seek out the pilot afterward and ask them to "reset their perspective", reminding them to remain 500 feet below clouds, and to maintain a thousand feet of ceiling and three miles visibility. These pilots would often tell him that they maintained those minimums, but he would encourage them to increase their safety margins. The POI said this kind of interaction required having inspectors in the field, but the FSDO had experienced significant staff turnover, and at the time of the accident there were only two Part 135 operations inspectors for the entire state of Hawaii.

The POI said that from the summer of 2018 to the beginning of 2019, he was a GS-14 carrying 2,600 complexity points and his workload had been unmanageable. In addition, he had conducted two accident investigations involving Novictor Aviation in April 2019 and these investigations had considerably increased his workload. Since then, his oversight responsibilities

[27] Interview Joseph Monfort.

had been reduced to about 10 Part 135 certificates, seven or eight Part 133 certificates, a couple of Part 137 certificates, and one Part 141 certificate. He felt this workload was manageable. At present, however, there was not sufficient time for inspectors at the Honolulu FSDO to perform in person surveillance unless they had a specific reason. He had requested funds in the FAA's E2 system to travel to Kauai to perform on Safari in November 2019 and his request had been denied. He said that his surveillance had not identified Safari has a high-risk operator.

The POI stated that the FSDO's management team did not have operational backgrounds. The front-line managers had airworthiness backgrounds and the FSDO manager had a flight attendant background. As a result, he thought management did not have a good understanding of the concerns identified by POIs. The POI stated that 99% of the complaints the FSDO received from the public about air tours were related to noise.

Another general aviation POI who was working at the Honolulu FSDO at the time of the accident had been employed there since 1997.[28] He had served as POI for Safari more than twenty years before the accident. Asked to describe the biggest safety issues for air tour operations, he said there were no general issues, each operator had its own specific issues. Asked to describe how he conducted surveillance of air tour operators, he stated:

> Generally I look at their procedures. We are unable to go too much, see them enroute due to the terrain. It's kind of complicated to be able to watch them in or out. But I do enroute inspection time to time. Generally once a year at least, with each operator that I have, I'll do a flight. For the rest of the surveillance, I generally focus on the passenger manifest and operation at the airport and then discuss if there's an issue, discuss with the operator the issue specifics and look at each specific issue they have. But it's different for every operator.

This POI stated that he had looked at air tour company in-flight videos in the past, typically when he received a report about a problem with a company. He stated that most complaints the FSDO received about air tour operators involved noise. Asked to describe how he dealt with issues he identified at an air tour company, he stated:

> Depends on if the company has a SMS or if the company doesn't have a SMS. In general, with a SMS, I work with them on the SMS. And with a company that don't, I do work with the operator and try to get compliance -- to restore compliance if there is issue.

This POI was asked his opinion on the best approach to preventing VFR into IMC air tour accidents. He stated:

> It's difficult to answer this question because it doesn't have just one element. The best way in my opinion to improve on that is training and company willingness to abide by the rules.

[28] Interview FAA POI Gino Rezzonico.

NTSB investigators sought information about what had been discussed at required annual air tour operator safety meetings in recent years. Safari's operations specifications required "a 10-day advance written notice, with an agenda, of each formal air tour safety meeting" be provided to the Honolulu FSDO, so investigators submitted a formal request to the FAA asking for copies of agendas for annual air tour safety meetings held between 2016 and 2012. The FAA responded:

> "The requirement to hold the annual meetings is articulated in Op Spec B048 or LOA B548, depending on the operator. It is the operator's responsibility to provide us 10-day advance notice of the proposed meeting as well as the agenda for that meeting. There is no requirement for either the FAA or the operator to retain the agendas; therefore, the FAA does not have the requested copies of the agendas. Further, since the meeting is an annual requirement, once the new meeting is complete, the previous year's agenda becomes almost irrelevant."

Investigators asked Safari to provide any air tour safety meeting records they might have. Their records indicated that in 2018, 37 personnel from various operators were in attendance. In 2017, 29 people were in attendance.

### 8.2.5 Effort to Revise or Replace the HATCPM

The previous Honolulu FSDO manager said that one of the air tour operators had called for a revision to the HATCPM during a safety meeting. They were particularly interested in seeing updates to the flight routes and emergency landing areas. An operations inspector was assigned to that effort. The FSDO had involved Helicopter Association International (HAI) in the effort because some of the pictures in the manual were outdated. She thought that the manual revision had nearly been completed by the time she left her position.

The former front-line manager at the Honolulu FSDO who left in October 2019 said "a lot of activity" had gone into updating the HATCPM.[29] Two Honolulu FSDO inspectors had been involved in revising the manual, but around 2018 the FAA transitioned responsibility for revising the HATCPM to the air tour industry. He stated that the current Honolulu FSDO manager had taken charge of the project, and that the manual had been under review for about a year "with no momentum."

Safari's POI said that in the past he and another general aviation POI had frequently interacted with the air tour subject matter expert in AFS-250 about proposed revisions to the HATCPM, but three years before the accident, the FSDO manager had removed them from the process, and she had begun dealing directly with the AFS-250 subject matter expert on the revisions. The POI did not know why the FSDO manager had made this change. Neither he nor the other general aviation POI had received any updates about the status of this effort.

[29] Interview Curtis Whaley.

The Honolulu FSDO manager stated that updating the HATCPM had been the main focus of air tour oversight during her tenure. Describing the effort to update the HATCPM, she stated:

> ...air tours in Hawaii have been under, I guess, a microscope with the community, the community is very aware of their presence and noise is an issue, but it's very complex for us to be working through things. And so we have had community meetings, we have talked with the state as technical advisors, or not advisors, as technical representatives to answer questions and then also working through questions with the HATCPM.

She stated that the Hawaii Helicopter Association (HHA) had proposed submitting a replacement for the HATCPM and maintaining it, and the FSDO had been working with the industry on that effort. She was the "lead point of contact" for the effort, and she had been working with an inspector in the FAA's Part 135 Air Carrier Operations Branch policy branch (AFS-250) regarding "the route we take and what's going on". She stated that the AFS-250 inspector was an air tour subject matter expert who would be assisting with "any computation with regard to content on anything that's submitted or with regard to our internal policy and procedures". Asked to explain the decision to have industry take the lead on the HATCPM update, she said:

> Industry has stated that they were interested in taking this on because these are truly safety procedures and that they would like to possess them as a portion of their manual systems; however, again, we have not seen anything presented to us from any one of the operators.[30]

She had held an initial meeting with the president of HHA shortly after she joined the FSDO in 2017, but she had not met with HHA to discuss the HATCPM since that time and she did not know what they were doing. HHA had not included the FSDO in their meetings. Regarding the status of the revision effort, she stated:

> The current HATCPM, which is in its original state dated 2008, is the current controlling document. There has been discussion on, like I said, ongoing talks of a replacement coming to us from industry; however, that has not happened, realizing that this is a very complex issue and that we need to take some action. The FSDO is currently looking at alternate options for a replacement.[31]

The Honolulu FSDO manager said there was no target date for replacing the HATCPM. Asked if there was a specific roadblock to updating the HATCPM, she said she could not think of anything. It was just "an extremely complex and unique piece", adding:

> We have not had the resources to be able to commit to looking at everything. It does involve several people with the development of the HATCPM and because the document is currently a public document, there's a lot of energy behind it, there's

[30] Interview with FAA FSDO manager Tiffany Chitwood.
[31] Interview with FAA FSDO manager Tiffany Chitwood.

also a lot of group meetings looking at it because of the community concerns with regards to air tour. I do believe that it is making some progress towards making the needed revisions to it, but it does take time.

Investigators interviewed the FAA inspector who served as an air tour subject matter expert in AFS-250 to ask about her involvement in the HATCPM revision effort. She said she had been assigned to the project around 2015. She stated that the project was an FAA project, not her project. Asked to identify the leader of the team that was working on the project, she said that she was the leader. She was unable to estimate what percentage of her time had been devoted to the project, but said she was working steadily on it. She said she had been working with industry groups and the Honolulu FSDO. Several other FAA stakeholders had been involved, and she had also received input from a roundtable that had included HAI, HHA, FAA air traffic organizations, congressional delegations, and the public. Many issues had been discussed, and noise complaints had figured prominently.

Asked whether she had also been getting input from the FAA's Honolulu FSDO office, she said that she had received input from two inspectors and two front-line managers at the Honolulu FSDO, but for the last three years she had been working with the FSDO manager. Asked how recently she had met with Hawaii air tour operators, she said she had met with some in California in January 2020. Asked how recently she had organized or attended a meeting with Hawaii air tour operators in Hawaii, she said she had attended a meeting about a year and a half before her interview in June 2020. She stated that the Honolulu FSDO manager had been the primary point of contact for the operators. Asked whether inspectors at the Honolulu FSDO were still working on revisions, she said she did not know what the FSDO was doing.

Asked to describe the vision for the updated manual, she said the vision was for the manual to be up to date, and to incorporate NTSB safety recommendations, congressional input, and National Park Service input. She expected it would address the new weather cameras and voluntary implementation of SMS. The goal was for the updated manual to be simpler, safer, and easier to manage. Asked what types of safety issues had been most prevalent in past fatal air tour accidents in Hawaii, she said she thought most Hawaii air tour accidents were related to human factors and pilot judgment involving the weather. Asked how the manual update might address those issues, she said she did not know. On further reflection, she stated that it would encourage SMS. There might be some training and checking on specific weather patterns, or on the use of FAA weather cameras. She said there was no estimated completion date for the project. It had been challenging getting all the stakeholders to agree to something.

## 9.0 Additional Information

### 9.1 Hawaii Pilot Perspectives on Inadvertent IMC Encounters

During post-accident interviews, local pilots, company managers, and FAA inspectors provided various other information about the high degree of hazard posed by inadvertent flight into IMC and they described techniques they had personally used, heard of other pilots using, or recommended for surviving such encounters. Such techniques cited included precautionary off airport landings, hovering close to terrain and using a nearby object as an attitude reference,

flying a constant heading and altitude toward the ocean and tuning in a nearby VOR, or initiating a climb away from terrain followed by a 180-degree course reversal.

### 9.2 FAA and Industry Guidance on Escaping Inadvertent IMC Encounters

Although not specifically referenced in the company's training materials, various other sources of industry guidance on this topic were available in the public domain. The Helicopter Flying Handbook, FAA-H-8083-21B, Chapter 11, Helicopter Emergencies and Hazards, VFR Flight into Instrument Meteorological Conditions, stated in part:

> While commercial helicopter operators often prefer their pilots to be instrument rated, fatal accidents still occur as a result of IIMC. Many accidents can be traced back to the pilot's inability to recover the helicopter after IIMC is encountered, even with adequate equipment installed. Therefore, whether instrument rated or not, all pilots should understand that avoiding IIMC is critical.
>
> A good practice for any flight is to set and use personal minimums, which should be more conservative than those required by regulations for VFR flight. In addition, a thorough preflight and understanding of weather conditions that may contribute to the risk of IMC developing along a planned route of flight is essential for safety. Pilots should recognize deteriorating weather conditions so the route of flight can be changed or a decision made to terminate the flight and safely land at a suitable area, well before IIMC occurs. If weather conditions deteriorate below the pilot's personal minimums during flight, a pilot who understands the risks of IIMC knows that he or she is at an enroute decision point, where it is necessary to either turn back to the departure point or immediately land somewhere safe to wait until the weather has cleared. Pilots should recognize that descent below a predetermined minimum altitude above ground level (AGL) (for example, 500 feet AGL) to avoid clouds or, slowing the helicopter to a predetermined minimum airspeed (for example, slowing to 50 KIAS) to reduce the rate of closure from the deteriorating weather conditions, indicates the decision point had been reached. Ceilings that are lower than reported and/or deteriorating visibility along the route of flight should trigger the decision to discontinue and amend the current route to avoid IIMC.
>
> There are five basic steps that every pilot should be familiar with, and which should be executed immediately at the onset of IIMC, if applicable. However, remember that if you are not trained to execute the following maneuvers solely by reference to instruments, or your aircraft is not equipped with such instruments, this guidance may be less beneficial to you and loss of helicopter control may occur:
>
> 1. Level the "wings" – level the bank angle using the attitude indicator.
> 2. Attitude – set a climb attitude that achieves a safe climb speed appropriate to your type of helicopter. This is often no more than 10° of pitch up on the attitude indicator.

3. Airspeed – verify that the attitude selected has achieved the desired airspeed. It is critical to recognize that slower airspeeds, closer to effective translational lift, may require large control inputs and will decrease stability, making recover impossible while in UIMC.
4. Power – adjust to a climb power setting relative to the desired airspeed. This should be executed concurrent with steps 2 and 3.
5. Heading and Trim – pick a heading known to be free of obstacles and maintain it. This will likely be the heading you were already on, which was planned and briefed. Set the heading bug, if installed, to avoid over-controlling your bank. Maintain coordinated flight so that an unusual attitude will not develop.

Try to avoid immediately turning 180°. Turning around is not always the safest route and executing a turn immediately after UIMC may lead to spatial disorientation. If a 180° turn is the safest option, first note the heading you are on then begin the turn to the reciprocal heading, but only after stable flight is achieved (items 1 through 5 above) and maintain a constant rate of turn appropriate to the selected airspeed.

Each encounter with UIMC is unique, and no single procedure can ensure a safe outcome. Considerations in determining the best course of action upon encountering UIMC should include, at a minimum, terrain, obstructions, freezing levels, aircraft performance and limitations, and availability of ATC services.

Flight Safety Foundation, Helicopter Safety (Vol. 22 No. 2, March – April 1996), Every Helicopter Pilot Must Be Prepared for Inadvertent Entry into Instrument Meteorological Conditions, stated in part:

"Tests conducted with qualified instrument pilots indicate that it can take as much as 35 seconds to establish full control by instruments after the loss of visual reference with the surface. And those tests were conducted in fixed-wing aircraft, which are inherently stable in flight. To establish full control by instruments in a helicopter, which is inheritably unstable, could take even longer.

As soon as the aircraft is under control by reference to instruments, a climb should be initiated. Often, inadvertent IMC encounters occur at low altitudes where flight into terrain is a threat if the aircraft is in even a slight descent. The pilot should initiate a controlled climb to an altitude that will provide obstruction clearance in the area of operation.

After the aircraft is in a controlled climb, the pilot can elect to turn carefully to a new course if known obstructions are ahead, or if the pilot believes weather will improve in a different direction."

### 9.3 Requirement for Emergency Medical Services Operations Control Centers

In response to NTSB recommendation A-06-14, the FAA published a final rule February 21, 2014, that addressed helicopter air ambulance, commercial helicopter, and general aviation helicopter operations. The rule stated, in part:

> "Requires certificate holders with 10 or more helicopter air ambulances to establish operations control centers (OCC) (§ 135.619) …"
>
> "OCC personnel will communicate with pilots, provide weather information, monitor flights and assist with preflight risk assessments providing an additional measure of safety for complex operations…"

### 9.4 FAA Survey of Hawaii Air Tour Operators

The operations group chairman requested the FAA survey Hawaii air tour operators to determine if they had implemented SMS and whether they routinely reviewed onboard video recording systems for safety assurance purposes. The survey consisted of the following three questions:

1. Does your company utilize any onboard video recording of your air tours? If yes, please briefly describe your video recording system.
2. Does your company management review video recordings to monitor the performance of your pilots? If yes, please briefly describe the process by which this is accomplished, who performs the reviews, and how frequently it is done.
3. Does your company have an established Safety Management System in place? If yes, please briefly describe the elements of your SMS (for example, Flight Operational Quality Assurance, Flight Data Monitoring, Confidential Safety Reporting, etc).

The FAA submitted these questions to 18 Hawaii air tour operators by email in January 2020, and 14 responded. Redacted information from the operators' responses was provided to the NTSB, and that information is summarized in Table 3.

| FAR Part | Onboard Video | Video Review | Video Comments | SMS Program |
|---|---|---|---|---|
| 135 | No | Not Applicable | Not Applicable | No |
| 135 | No | Not Applicable | Not Applicable | No |
| 135 | No | Not Applicable | Not Applicable | No |
| 135 | No | Not Applicable | Not Applicable | No |
| 135 | No | Not Applicable | Not Applicable | No, but researching currently. |

| | | | | |
|---|---|---|---|---|
| 135 | Yes | Yes, formal written process in place. | Four cameras, one forward and two side, one internal. | Yes |
| 135 | Yes | Yes, formal written process in place. | Four cameras, one each side, one forward, one internal. | Yes |
| 135 | No | Not Applicable | Not Applicable | No |
| 135 | Yes | Yes, review system in place. Videos are pulled randomly and pilots are counseled as needed. Transitioning this to headquarters function to make it a more blind random system. | Four cameras, one forward and two side, one internal. | No |
| 135 | Yes | Yes, Chief Pilot regularly does. Several times per week. | Four cameras, one forward and one right, two internal. | Yes, but not a formal FAA program. Internal only. |
| 135 | No | Not Applicable | Not Applicable | No |
| 135 | No | Not Applicable | Not Applicable | No |
| 135 | Yes | Yes, randomly by Chief Pilot or DO from "time to time". | Nose mounted camera. | No |
| 135 | Yes | Yes, randomly by Chief Pilot or DO from "time to time." | Upgrading camera systems now. | No |

**Table 3: Findings of a February 2020 FAA survey of Hawaii air tour operators.**

### 9.5 Helicopter Design Countermeasures for Surviving Inadvertent Flight Into IMC

The focus of industry and government efforts to reduce helicopter inadvertent flight into IMC accidents is to keep VFR helicopters out of instrument conditions. However, a recent U.S. Helicopter Safety Team (USHST) study found that the average time between an IMC encounter and ground impact during helicopter VFR into IMC accidents is just 56 seconds.[32] The USHST recently recommended the development of technologies to reduce pilot workload to increase the odds of surviving such encounters.[33] As part of its efforts to improve the safety of civil helicopter operations in the National Airspace System, the USHST's team of government and industry stakeholders proposed a project called Helicopter Safety Enhancement 70 (H-SE 70). The statement of work for H-SE 70 read as follows:

[32] U.S. Helicopter Safety Team. (2021). 56 seconds to live: Unintended flight in instrument meteorological conditions (UIMC). Report prepared by the USHST UIMC Safety Initiative Team efforts to provide industry training that can reduce the risk of fatal helicopter accidents. April 28, 2021.
[33] U.S. Helicopter Safety Team. (2021). Loss-of-control in-flight mitigation through installation of stability augmentation and autopilot systems in light helicopters. Helicopter Safety Enhancement No. 70 Output No. 3. February 9, 2021.

> The USHST Safety Analysis Team identified loss of control in flight (LoC-I) as one of the top three most common occurrence categories of fatal civil helicopter accidents in their 2009-2013 dataset. Current light helicopters have flight characteristics that are challenging and demanding of pilot workload. The purpose of this H-SE is to increase safety by encouraging the development and installation of a stability augmentation system (SAS) or autopilot devices that increase the flight stability of light helicopters.
>
> SAS/autopilot devices must be designed to reduce the incidence of loss of control in flight (LoC-I) and should consider new and retrofit configurations not currently supported by similar devices. The devices should also consider low visibility, low ceilings, and unintended IMC, and preferably enhance safety without requiring pilot action. A SAS/autopilot device may embody commercial off-the-shelf (COTS) pneumatic, electronic, micro-electromechanical systems (MEMS), or mechanical devices to sense or control helicopter motion.

In February 2021, the USHST released several recommendations based on the work of its H-SE 70 team. These included the following:

- Expand and formalize industry and authority collaboration (e.g., FAA Aviation Rulemaking Advisory Committee, US Helicopter Safety Team, etc.).
- Establish VFR certification criteria for AFCS and SAS, focusing on the basic AFCS modes detailed above, designed for use in VMC but that may also provide substantial safety benefits when short-term degraded visual conditions may exist, such as IIMC
- Engage with trade associations, insurance providers, and Congress to advocate the incorporation of new safety-enhancing technology.

Additional recommendations were aimed at collaborating with various industry partners and streamlining certification criteria.

## LIST OF ATTACHMENTS

Attachment 1 - Operations Group Interviews

Attachment 2 - Previous Safari Flight's Passenger Statement

Attachment 3 - Helicopter Flying Handbook, Chapter 11

Attachment 4 - Flight Safety Foundation Publication - March-April 1996

Attachment 5 - Aircraft Daily Log, N985SA

Attachment 6 - Accident Flight Weight and Balance Form

Attachment 7 - Hawaii Air Tour Common Procedures Manual

Attachment 8 - Aircraft Flight Manual Section 5 Regulatory Performance Data

Attachment 9 - Pilot Training and Competency Check Records

Attachment 10 - Safari Aviation Operations Specifications and Operations Manual Excerpt

Attachment 11 - Safari Aviation Company Policy for Pilots Excerpt

Attachment 12 - Safari Aviation Company Adverse Weather Procedures and Risk Assessment Tool

Attachment 13 - Pilot Scheduling Calendar

Attachment 14 - Pilot Initialed Weather Printout

Attachment 15 - Safari Aviation Advertisement - Published in the Kauai Drive Guide Vacation Planner - dated December 2019 - May 2020

Attachment 16 - Safari Aviation Departure/Arrival Time Record

Attachment 17 - Annual Air Tour Safety Meeting Attendance Records and Agenda