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

CEN23FA071

OPERATIONS GROUP CHAIRMAN REPORT

March 18, 2024

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A. ACCIDENT

Location:	Galliano, Louisiana
Date:	December 29, 2022
Time:	0832 CST 1432 UTC
Helicopter:	Bell 407 / N595RL

B. OPERATIONS GROUP CHAIRMAN REPORT

Group Chair	Fabian Salazar National Transportation Safety Board (NTSB) Federal Way, Washington
Party Coordinator	Jason Melancon Rotorcraft Leasing Company, LLC (RLC) Broussard, Louisiana
FAA Representative	Edwin Miller (Video Review Only) Federal Aviation Administration (FAA) Baton Rouge, Louisiana
Recorders Specialist	Deven Chen NTSB Vehicle Recorders Laboratory Washington D.C.

C. SUMMARY

On December 29, 2022, about 0832 central standard time, a Bell 407 helicopter, N595RL, call sign, Island 45, was substantially damaged during takeoff from an offshore platform in the Gulf of Mexico. The pilot and 3 passengers were fatally injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 135 flight.

D. DETAILS OF THE INVESTIGATION

On Tuesday, January 3, 2023, the Operations Group Chairman travelled to Lafayette, Louisiana, with further travel to Broussard, Louisiana, to prepare for the beginning of the investigation.

On Wednesday, January 4, 2023, the Operations Group Chairman was redirected to South Lafourche Leonard Miller Jr. Airport (GAO), Galliano, Louisiana, with subsequent helicopter transportation to the production platform commonly referred

to as "West Delta 106" (WD-106) to conduct a survey of the accident site. An employee of Island Operating Company, Lafayette, Louisiana, travelled with the Operations Group Chairman to WD-106 via helicopter. Three employees of Bureau of Safety Environmental Enforcement (BSEE) travelled to WD-106 in another helicopter. The BSEE investigation was conducted concurrent the NTSB investigation. Three additional employees of Island Operating Company were present on WD-106. Upon completion of the site survey, the Operations Group Chairman travelled to Baton Rouge, Louisiana, to deliver wreckage components to the NTSB Investigator-In-Charge (IIC) and Airworthiness Group Chairman and to discuss his observations made while on WD-106. Upon completion of the briefing, the Operations Group Chairman travelled to the RLC facility at Broussard, Louisiana, to prepare for interviews the following day.

January 5-6, 2023, the Operations Group Chairman conducted interviews of witnesses and selected RLC employees.

On January 7, 2023, the Operations Group Chairman finalized his field notes before he returned to Salt Lake City, Utah, where he continued his duties from his home station.

On March 12, 2023, the Operations Group traveled to the NTSB headquarters, Washington, DC, to audition the helicopter's Appareo Vision 1000 video of the accident flight and a passenger's personal electronic device (PED) video of the accident flight. Both videos were auditioned and documented on March 13, 2023.

On November 2, 2023, the Operations Group Chaiman and the Recorders Specialist travelled to the RLC base at Galliano, Louisiana, with additional travel to WD-106, to gather additional data for the investigation and conducted follow up interviews with the Island Operations employees.

E. FACTUAL INFORMATION

1.0 HISTORY OF FLIGHT

According to Automatic Dependent Surveillance-Broadcast (ADS-B) track data, and parametric data from the onboard video camera, at 0748, the helicopter departed the South Lafourche Leonard Miller Jr. Airport (GAO), Galliano, Louisiana, and continued to WD-106, a production platform owned by Walter Oil and Gas Company, Houston, Texas, and operated by Island Operating Company, Lafayette, Louisiana. According to the flight manifest, as provided by RLC, four passengers, their baggage, and a 70 lbs box were on board.

According to the NTSB Video File and Onboard Image, Audio, and Data Recorder Factual Report, the 38[1]-minute flight to the platform was uneventful. The helicopter arrived at the platform about 0826. The pilot landed on the helideck, on a heading of about 145° magnetic and reduced the engine speed to about idle. According to the passengers, the four exited the helicopter from the left-hand side, taking their baggage and the 70 lbs box. The pilot was then to transport three passengers and their baggage back to GAO. Based on recovered footage from the onboard video camera, there was no evidence of any abnormalities from the point that the inbound passengers exited the helicopter to the point when the outbound passengers boarded the helicopter.

About 0831, while the helicopter was resting on the helideck, the aiming circle was visible in the pilot's chin bubble. The aiming circle intersected the lower section of the instrument panel. Shortly afterwards, the pilot began to advance the throttle toward 100%. All engine and system instruments appeared in their normal ranges. A short time later the engine instruments began to increase, and the helicopter began to move, consistent with getting light on the skids. The engine torque gauge then began to increase, and the attitude indicator showed a roll to the right that increased to about 22° right bank before the instrument was obscured by the pilot's body at 0832:53. The video footage stopped about a half second later, consistent with a power interruption to the camera.

One of the outbound passengers used his mobile phone to capture a video during the takeoff. The passenger, who was seated in the forward-facing seat on the left side of the passenger cabin, took the video looking out the left side of the helicopter. A review of the video footage revealed that the helicopter remained stationary while the engine and rotor RPM noise increased, consistent with engine and rotor speed increasing from idle to fly. Shortly afterwards, the helicopter began to ascend with no apparent drift left or right nor forward or back. The left skid then appeared in the view as the helicopter entered a right roll. Very shortly afterwards fragments, consistent with material form the main rotor blade, were seen in the air.

There were no eyewitnesses to the accident. When interviewed, all arriving passengers gave similar statements regarding the events of the morning. They described the outbound flight to the platform as normal. Three of the four passengers recalled the pilot landed the helicopter to the southeast. The remaining passenger recalled the pilot had landed to the southeast but "relocated" to the northwest. While his recollection of the pilot repositioning to the northwest and his actions after the landing were very detailed, it was not consistent with the other 3

[1] Flight time is based on the take off and arrival time as determined by the recorder's laboratory examination of the Appareo video data. Flight time for the accident flight was 38 minutes or 0.7 hour, based upon the recorded takeoff parametric data (0748 to 0826). Total flight time from takeoff to the accident was 45 minutes or 0.8 hour (0748 to 0833).

passengers aboard the same flight, nor with the recorded Appareo video and recovered parametric data.

The arriving passengers gave similar accounts of their actions following the outbound flight. One passenger reported that the pilot received a "green deck" call about 18 minutes before landing. All the passengers reported that after the landing they exited from the left side of the helicopter, recovered their bags from the aft-left baggage compartment, walked around the nose of the helicopter to the stairs, and then descended below the helideck.

After the descending from the helideck, the four arriving passengers met and spoke with the three departing passengers for about 2-3 minutes. The arriving passengers then entered the galley. A fourth would-be departing passenger, stayed on the platform and was in the galley. While in the galley, all individuals interviewed reported hearing the helicopter increase its rotor speed, which was followed by a loud noise and the sound of items striking the platform. No one reported that they saw the helicopter contact the platform or fall to the water. One individual stated that they were outside in seconds and saw bubbles coming up from the water. The helicopter was observed floating upside down. Three of the employees manned the platform's CA-1401 enclosed survival craft (survival craft) and were lowered to the water to try to reach the helicopter; however, concerns about the debris in the water prevented the operator of the survival craft from reaching the helicopter. Phone calls were made to the helicopter operator (RLC) and the Coast Guard. Before entering the survival craft, one person made multiple calls to report the accident. He reported calling Galliano base at 08:36, the RLC Chief Pilot at 08:38, and Aviation Safety Advisor, Island Operating Company at 08:42.

The helicopter sank into the Gulf of Mexico and was subsequently located on January 2, 2023. The helicopter was recovered the following day and transported to a secure facility in Baton Rouge, Louisiana, where it was examined.

The helicopter's Appareo Vision 1000 video recorder was recovered from the water on January 28, 2023, and sent to The NTSB Vehicle Recorders Laboratory for download and review. Additionally, two mobile phones were recovered. One of these mobile phones contained the left-rear seat passenger's video recording that was previously discussed.

2.0 PILOT INFORMATION

2.1 PILOT'S HISTORY

According to the pilot's resume, he held an unidentified degree in industrial design from the University of Vila Velha, Vila Velha, Brazil, and attended the Hillsboro Aero Academy, Hillsboro, Oregon. Before gaining employment with RLC, he worked for

five helicopter operators, and had experience with Robinson, Guimbal, Bell, and Sikorsky helicopters.

The pilot was hired by RLC on September 12, 2022. He was assigned the Bell 407 as his initial aircraft. He completed the initial ground training and initial flight training on September 28, 2022, and was assigned as a visual flight rules (VFR) pilot-in-command (PIC) on the same day. Records show that he completed the Title 14 CFR Part 135.293 initial pilot testing,135.299 line check, and PIC check on September 28, 2022.

2.2 PILOT'S CERTIFICATES HELD AT THE TIME OF THE ACCIDENT

The pilot was a 32-year-old male who listed his primary residence as New Fairfield, Connecticut. He had a commercial pilot certificate with a rating for helicopter, helicopter flight instructor, and helicopter instrument instructor. He held a second-class medical certificate, without limitations.

2.3 PILOT'S TRAINING AND PROFICIENCY CHECKS

RLC Form TR-6, dated September 28, 2022, revealed that the pilot received his initial new hire training in accordance with Title 14 CFR Parts135.331 and 135.345, initial training as a VFR PIC, and was deemed satisfactory in the following areas:

- Basic Indoctrination
- General Emergency / Situation & Drill 12 mo.
- General Emergency / Hands-On Drill 24 mo.
- Operational Control
- Hazmat
- Aircraft Ground
- Differences: Aircraft
- Aircraft Flight
- Qualification
- Float Ship
- Water Survival 36 mo.
- H2S Qualified 12 mo.

RLC Form TR-7 itemized the pilot's training flight hours, in part,

- 16.8 hours day
- 16.8 hours total
- 7.0 hours offshore
- 1.4 hours hood
- 4 instrument approaches
- 9 engine starts

Of the above items, 2.0 hours of flight, and 0.3 hours of simulated instrument time, 3 starts, and 7 aborts were conducted in a simulator. Additionally, a grade slip (TR-8C) revealed that all tasks conducted in the Flight Training Device (FTD simulator) were graded as satisfactory.

Flight grade slips dated September 13, 18, 19, 20, and 23, 2022, evaluated the pilot as satisfactory in task "Dynamic Rollover (Oral)". Grade slips dated September 19, 20, 21, 24, and 27, 2022, graded the pilot satisfactory in "Pinnacles or Platform".

The 3-page RLC Progress Report, dated August 30, 2022, indicated that the pilot had completed the initial new hire 407 training. The pilot signed an acknowledgement of training certificate on September 28, 2022.

Non-aviation specific training records showed the pilot completed the RLC Safety Training in accordance with Title 29 CFR Part 1910 on September 26, 2022. He completed the RLC H2S in accordance with OSHA 30 CFR 250.490 on September 17, 2022. He completed Water Survival / HUET (METS) and Swing Rope/Personnel Transfer training on September 22, 2022.

2.4 PILOT'S FLIGHT TIMES

When the pilot submitted his resume to RLC for employment, he reported a total flight experience of 1,512 hours in helicopters, of which 1,188 hours were flown as PIC. Table 1 itemizes the total hours flown while an employee of RLC, including the 0.8-hour outbound flight flown on the day of the accident. When combined, the pilot's total flight experience in helicopters was about 1,667.8 hours, of which about 1,343.8 hours were flown as PIC.

Month	206B Hours	407 Hours	PIC Hours
September	1.3	16.4	17.7
October		45.6	45.6
November		45.4	45.4
December		47.1	47.1
Total	1.3	154.5	155.8

Table 1. Pilot flight experience while employed by RLC

2.5 PILOT'S EXPERIENCE AT WD-106

A review of records revealed that the pilot had operated to-and-from WD-106 a total of 24 times.

2.6 PILOT'S ON-DUTY AND OFF-DUTY HISTORY

The pilot completed training in September 2022 and began operating for the company in October 2022. He completed on and off-duty cycles for October, November, and December, and began his next on-duty cycle for the month of January, which started on December 29, 2023, the day of the accident.

Month	On Duty	Off Duty
October	October 7-19, 2022	October 20-November 2, 2022
November	November 3-16, 2022	November 17-30, 2022
December	December 1-14, 2022	December 15-28, 2022

Table 2. On-duty and off-duty periods

According to the pilot's wife, they traveled to Brazil during his last off-duty period. The three days before the accident were reportedly joyful and ordinary. The pilot was reportedly happy and well rested. On December 26, 2022, the pilot and his wife went jogging together, and bought groceries to prepare for a family gathering. On December 27, 2022, while still in Brazil, the pilot picked up family members at the airport and they all enjoyed time on the beach. On December 28, 2022, the pilot departed for the United States. Afterwards, the pilot and his wife communicated via text messages, with his final communication transmitted on the morning of the accident described as a "good morning" text.

2.7 TAKE OFF AND LANDING REVIEW, ACCIDENT PILOT

RLC provided 103 preaccident videos captured from Appareo video cameras. Seven of the videos contained flights flown by the accident pilot. Due to a corrupted video file, one of the seven videos provided no image data. The remining six videos were reviewed. These videos contained a total of about 27 flights of the pilot taking off and landing to an offshore platform. For the purposes of the review, a flight was described as a takeoff-and-landing cycle. Additionally, only takeoff and landings from offshore helidecks were reviewed. Of the 27 flights reviewed, two takeoffs showed a pause with the helicopter established in a 3-5 ft hover, as directed by RLC policy. The remaining takeoffs revealed a continuous ascent and departure from the helideck, with no intermediate stop at 3-5 ft, and thus were inconsistent with RLC policy. Without knowledge of the size of the helideck, staff was unable to determine with certainty from video footage alone if the pilot landed to the center of those helidecks without a painted aiming circle. (Helidecks with aiming circles aided in the determination if the pilot landed to the center of the helideck.) All landings were made into the wind except one. In the one example of an apparent tailwind landing, the wind speed could not be determined, but the pilot displayed no difficulty in the landing.

2.8 TAKE OFF AND LANDING REVIEW, OTHER PILOTS

Video recordings of three additional RLC pilots were reviewed. Of six takeoffs, only one did not show a pause with the helicopter established in a 3-5 ft hover. All landings were flown in accordance with documented company procedures.

3.0 MEDICAL AND PATHOLOGICAL

An autopsy of the pilot was conducted by the Jefferson Parish Forensic Center, Harvey, Louisiana. The cause of death was multiple blunt force injuries with subsequent drowning due to a helicopter crash. Postmortem toxicological testing detected ethanol, isopropanol, and propanol (N01) detected in blood (cavity) vitreous and urine. N-butanol detected in blood (cavity). For additional information, see the NTSB Medical Factual Report.

4.0 HELICOPTER INFORMATION

The helicopter was a Bell 407, serial number 53595. For additional information, see the NTSB Airworthiness Factual Report.

4.1 HELICOPTER'S LANDING GEAR AND FLOAT SYSTEM

The helicopter was equipped with Dart Aerospace float skid tubes attached to high skid crosstubes. The float system used a forward, mid, and aft bag float system. The rear bag was attached to an aft skid section that measured about 46.5 inches from the center of the aft crosstube saddle to the aft end of the skid. The end of the skid was elevated five inches above the ground, as depicted in Figure 1.

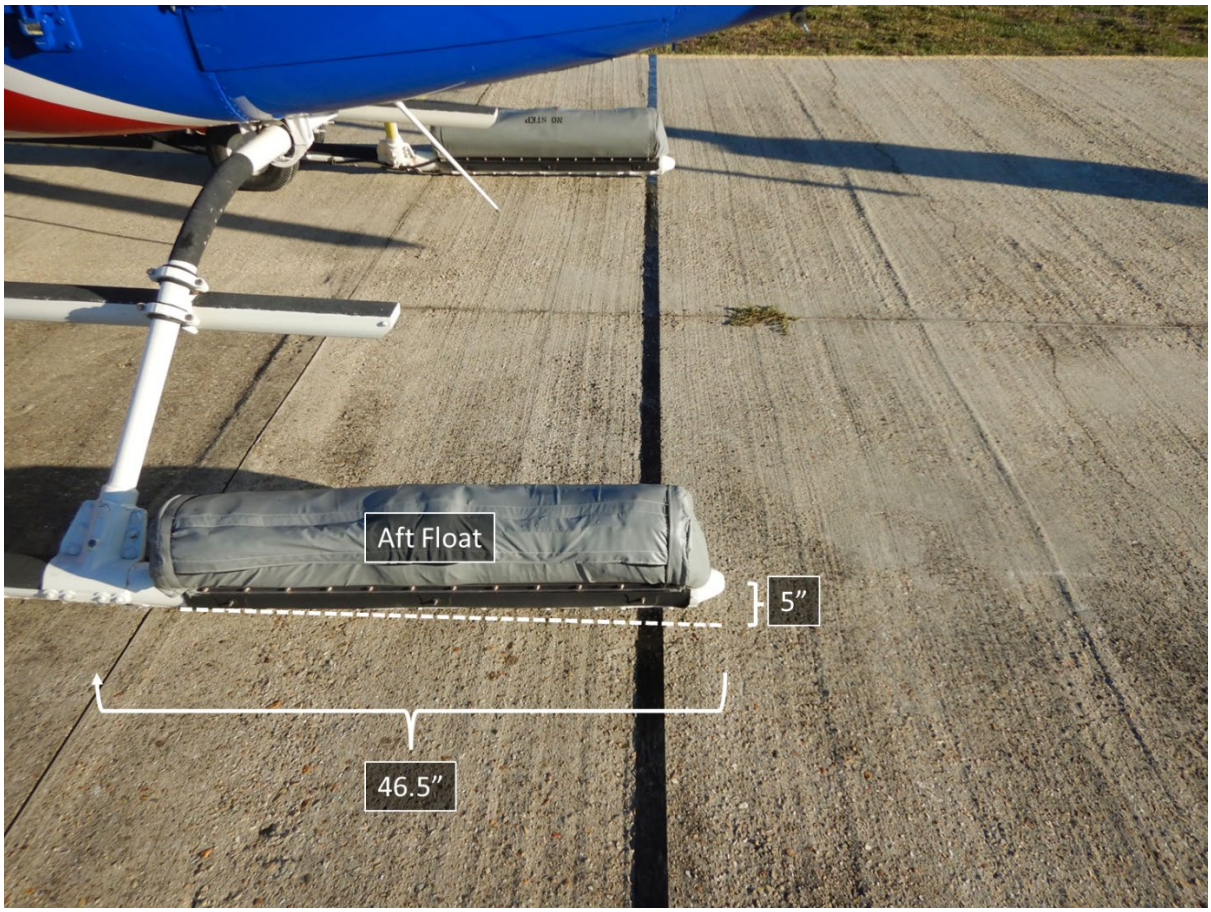

Figure 1. Exemplar helicopter showing the aft float and the aft skid section

The skids were also equipped with multi-piece wear shoes. The wear shoes were fastened to the skids with bolts that can be seen in the image of Figure 2. Examination of an exemplar helicopter’s wear shoes revealed that the bolt hole pattern was inline but not always equally spaced throughout the span of the skid.

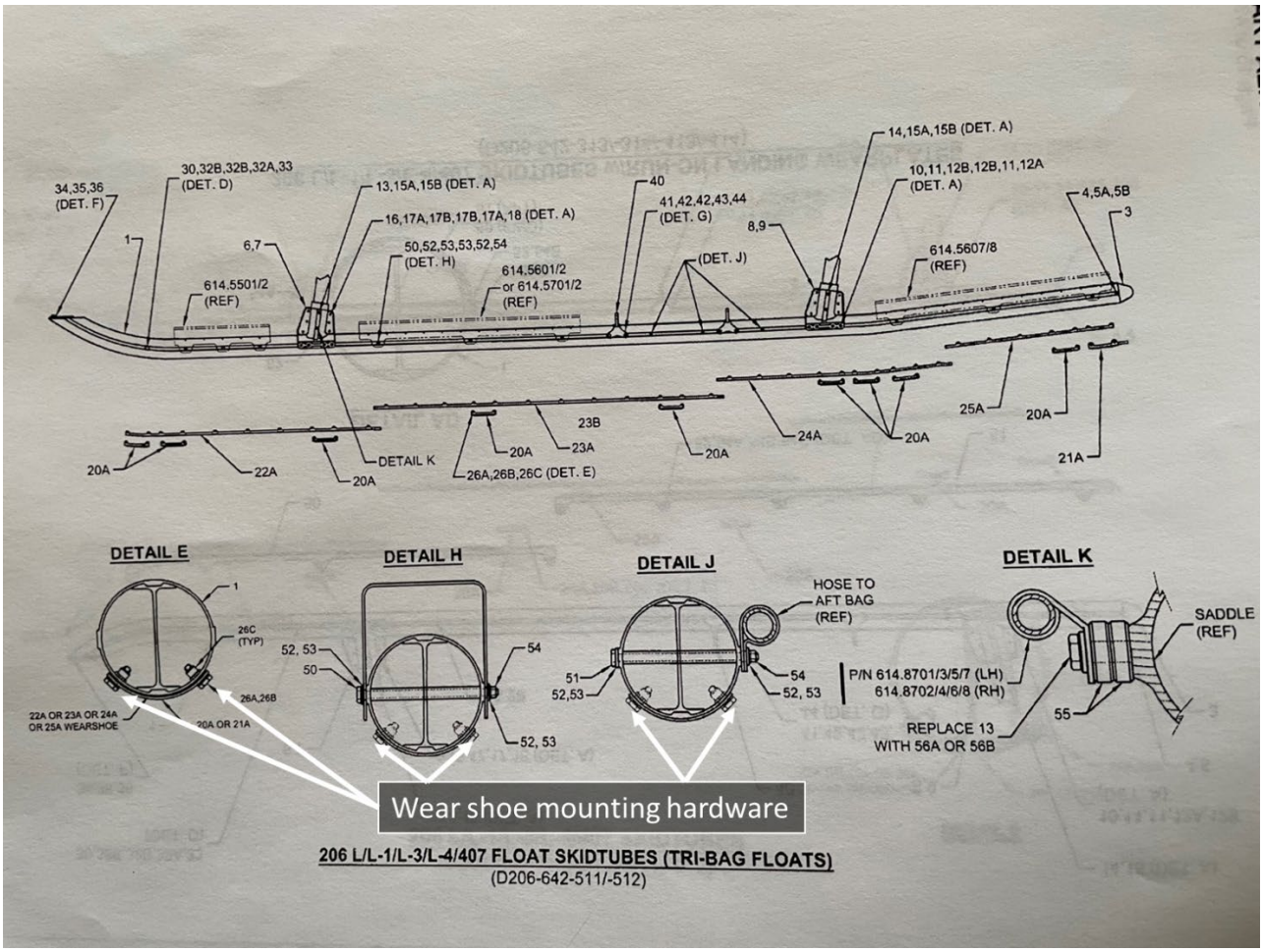

Figure 2. Image showing a skid tube for the 407 helicopters. Mounting hardware for the wear shoes are shown in the details and are pointed out by the arrows.

5.0 WEIGHT AND BALANCE

According to the Light Ship Flight Service Order (FSO) for the flight from WD-106 to GAO, the helicopter was loaded with a pilot, and three passengers. The helicopter's basic weight was 3,134 lbs. Fuel on board weighed 820 lbs at the beginning of the day. The pilot's weight was 240 lbs, which resulted in an operational weight of 4,194 lbs. The maximum gross weight of the helicopter was 5,250 lbs. The calculated payload available was 1,056 lbs. The combined weights of the three passengers was about 675 lbs. No data for personal baggage or the 70 lbs box was detailed in the FSO. The document stated, *"Pilot shall initial each flight # block to certify his compliance with weight and center of gravity limits."* Each of the three flight legs indicated a "DF" which were the pilot's initials.

According to the GOM and the Director of Training (DoT), the engine power restriction of no more that 85% power, resulted in a fuel consumption of about 330-350 pounds of fuel per hour. The helicopter had operated for about 0.7 hour, which calculated to about 231-245 lbs of fuel used, or about 34-36 gallons. As calculated,

the helicopter had 589-575 pounds (87-84.5 gallons) of fuel before the accident takeoff.

No manifest was recovered for the accident flight. The pilot and passengers were seated as shown in Figure 3. It was undetermined how many personal bags were loaded into the helicopter. Three personal bags and a C-Pap device in a bag were recovered from the Gulf of Mexico. A black bag, described as a backpack, weighed about 23 lbs wet. A blue bag, described as a duffle bag, weighed about 27 lbs wet. A third camouflaged backpack was recovered but its weight was undetermined. The C-Pap bag weighed about 10 lbs. No other bags were recovered.

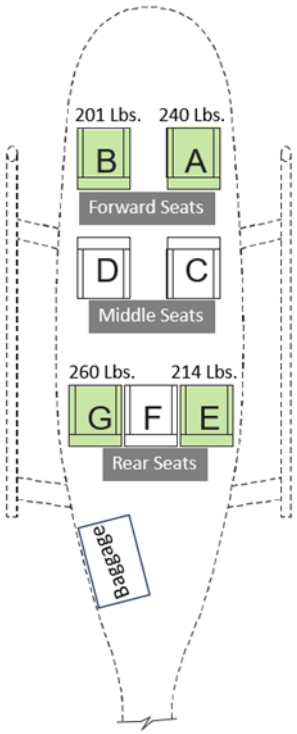

Figure 3. Tables showing the seating locations for the accident flight. The illustration shows the seats used and weights of the pilot and passengers. Total baggage weight was estimated at 60 lbs.

Seat	Name	Weight
A: Right front	Pilot	240 lbs
B: Left front	Passenger 1	201 lbs
C: Right middle	N/A	N/A
D: Left middle	N/A	N/A
E: Right rear	Passenger 2	214 lbs
F: Middle rear	N/A	N/A
G: Left rear	Passenger 3	260 lbs
Baggage	N/A	60 lbs est

Table 3. Seating locations of pilot and passengers for the accident flight

According to the Bell 407 GOM, Chapter 2, Weight and Balance states, in part,

A. *"When loaded in the following manner, the aircraft will remain within the CG limitations. Otherwise, the actual CG will be determined prior to takeoff and recorded on the FSO."*
   1. *Minimum pilot station weight: 170 pounds*
   2. *Weight allowance in the baggage compartment is zero pounds.*
   3. *Lateral CG: Must be loaded symmetrically. Lateral imbalance may not exceed 300 pounds when gross weight exceeds 5000 pounds.*
   4. *Selective Passenger Loading: When both crew seats are occupied, only one (1) mid passenger is permitted unless there are two (2) aft passengers.*

B. *Loading Envelope:*
   1. *Left front and middle seats empty. Weight allowance in baggage compartment is zero pounds.*
   2. *Weight in baggage compartment is allowable at a rate of one pound for every pound at the pilot station above 170 pounds or one pound for every two pounds in the middle seats, not to exceed 250 pounds in the baggage compartment.*
   3. *All passenger baggage weights must comply with structural limits."*

In a conversation with the DoT, he explained that the weight and balance information contained in the GOM meets the company's "Selective Loading Schedule." He further explained that the selective loading schedule is an industry standard that guides how passengers and equipment are to be loaded that ensures the helicopter stays within the weight and balance limits for the helicopter.

The DoT stipulated that the zero-weight allowance in the baggage compartment was the starting point, and that the pilot is allowed to place one pound of baggage in the baggage compartment for every pound above the minimum pilot weight of 170 lbs.

According to the DoT, after reviewing the seating arrangements, the weights of the passengers and the pilot, the fuel quantity, and personal baggage, the helicopter would have been loaded in accordance with the GOM and the selective loading schedule.

6.0 WEST DELTA–106 PLATFORM INFORMATION

The accident occurred on the WD-106 Production platform, located in the Gulf of Mexico at 28.831670° North latitude, -89.557830° West longitude. The WD-106 platform is depicted in Figure 4.

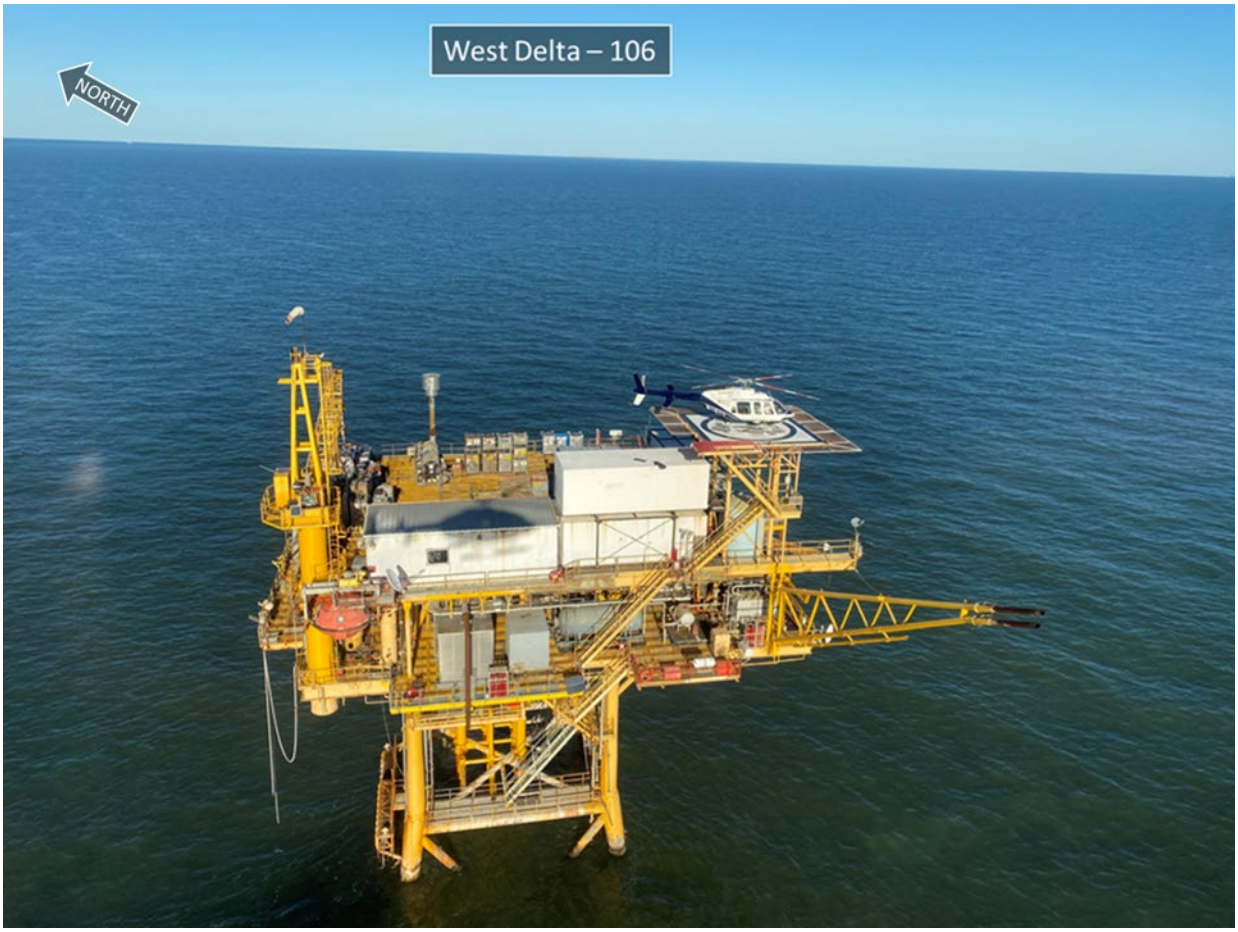

Figure 4. WD-106 platform with an exemplar Bell 407 helicopter on the helideck.

The platform was located about 51.3 nautical miles southeast of GAO as shown in Figure 5.

Figure 5. Google Earth image of GAO and WD-106.

WD-106 was owned by Walter Oil and Gas, Houston, Texas, and operated by employees of Island Operating Company, Lafayette, Louisiana. According to Walter Oil and Gas, the platform was constructed in accordance with American Petroleum Institute (API) 2L 3rd edition standards. WD-106 was equipped with a 24 ft by 24 ft helideck, located on the south corner. An engineering drawing is shown in Figure 6.

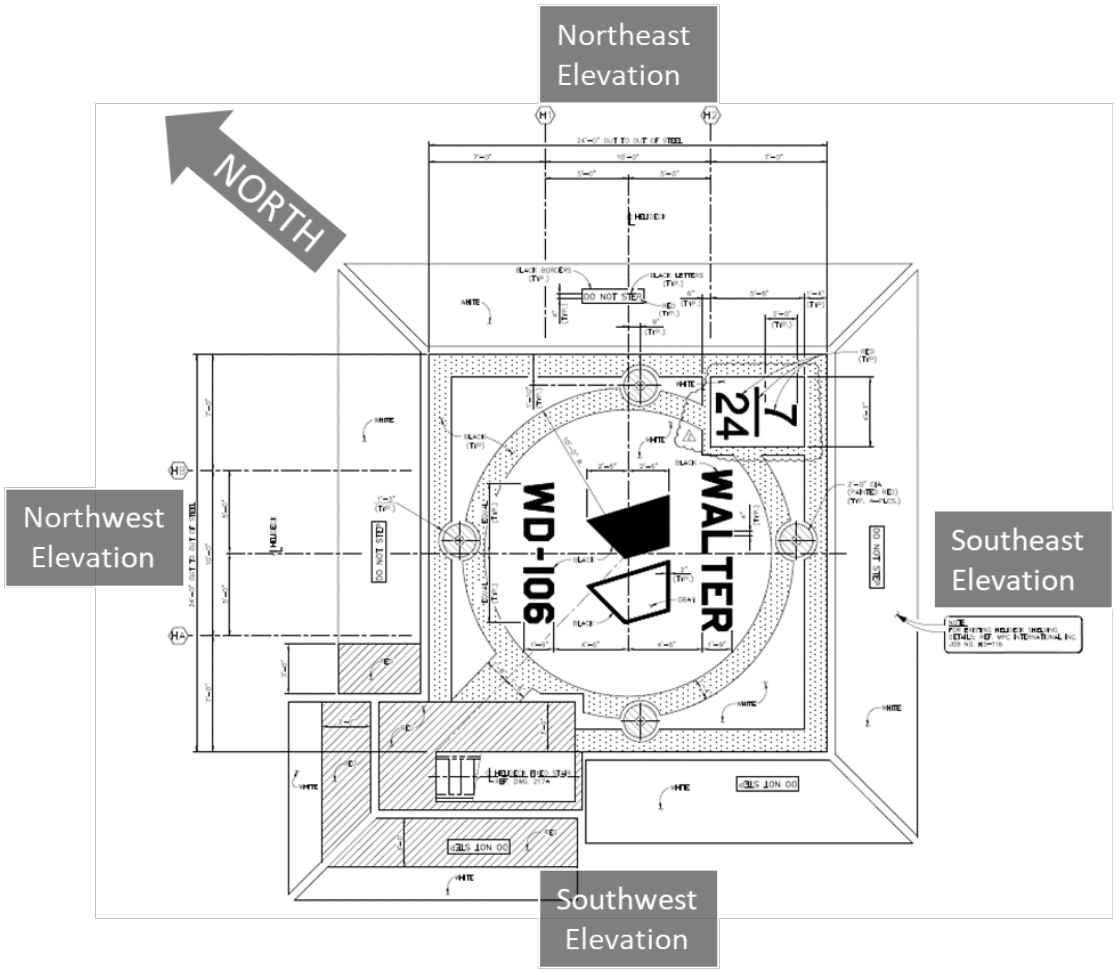

Figure 6. Engineering drawing of the WD-106 helideck showing magnetic north and the four elevations. Illustration courtesy of Walter Oil and Gas.

The helideck was outlined with eight lights of alternating amber and blue color. The light assemblies were guarded, no wiring was exposed and were located outboard of the flight deck. The light assemblies, whose attachment hardware to the helideck were not frangable, were about 8 inches tall. The helideck deck was painted white with a black boarder. A 10 ft diameter black aiming circle was in the center of the pad. The words “WALTER” and “WD-106” were painted inside the aiming circle, as was a gray and black “W” icon. The stairwell for the helideck was in the southwest elevation and had a red border around it. A metal perimeter safety skirting outlined the helideck. Except for the eight light assemblies, no objects were elevated, or stood proud on the helideck, as shown in Figure 7.

Figure 7. Close up image of an exemplar Bell 407 helicopter on the WD-106 helideck. Helideck perimeter amber lights are circled in amber, and perimeter blue lights are circled in blue. The arrow points to the light significant to the accident.

The API states, in part,

"For night use, perimeter lights should be used to delineate the heliport flight deck. Alternating yellow and blue omnidirectional lights of approximately 30-60 watts should be spaced at intervals to adequately outline the flight deck. A minimum of eight (8) lights are recommended for each heliport." The API further stated, in part, *"Flight deck lights should be outboard of the flight deck and should not extend over six (6) inches (15cm) above the flight deck. They should be guarded, have no exposed wiring, and be located so as not to be an obstruction. "Any inboard lighting should be flush mounted."*

7.0 PLATFORM AND HELIDECK EXAMINATION

Examination of the platform revealed composite debris scattered throughout the multiple levels of the platform. The scattered debris was consistent with the internal

materials of the main rotor blades. A majority of one of the main rotor blades (serial number A-1532) was located on the cellar deck, two levels below the helideck. The blade fragment exhibited a green dot and the letters “green” to identify it as the green blade. The green blade came to rest against a metal handrail. The handrail exhibited a downward bend near the location of the green blade. Three pieces of lead weight, consistent with the blade weights, were found on the cellar deck near the green blade, and multiple pieces of dark tinted acrylic, consistent with the- cabin roof windows of the helicopter were found in the same location. The acrylic shards exhibited red color transfer consistent with the red paint of the stairwell. A piece of white painted composite material, consistent with the transmission cowling, was found in the same area, the section exhibited the same red color transfer. Sections of the tail rotor were found on the main deck below the helideck. No specific object on the platform could be positively identified as the contact point of the tail rotor.

Further examination of the helideck, as shown in Figure 8, revealed the center blue light assembly on the northwest elevation was damaged but still remained attached to the 6 inch by 6 inch light mount. The light had remained installed on the mount, but the blue glass globe was fragmented and the metal protective guard for the globe was deformed and bent toward the stairwell. After the accident, an Island Operating employee removed the damaged light assembly from the mount out of concern for safety during future use of the helideck. An amber light, located on the west corner, near the stairwell separated from the mount and was not recovered. The red paint around the stairwell exhibited scratches and gouges. The safety skirting that bordered the stairwell (northwest and southwest elevations) was damaged. There were multiple impact marks on the metal frame of the helideck around and below the area of the damaged safety skirting and stairwell. Two areas of gouges in the paint on the helideck were present. The first area was a row of nine irregularly spaced but inline gouges, as shown in Figure 9, located inside the aiming circle, and adjacent to the “W” icon logo painted on the helideck. The second area was a group of five irregularly spaced gouges, found in the black paint of the aiming circle, as shown in Figure 10, near the northeast elevation and near the damaged center light. Figure 11 is an illustration showing the location of the two areas of paint gouges and the damaged light assembly.

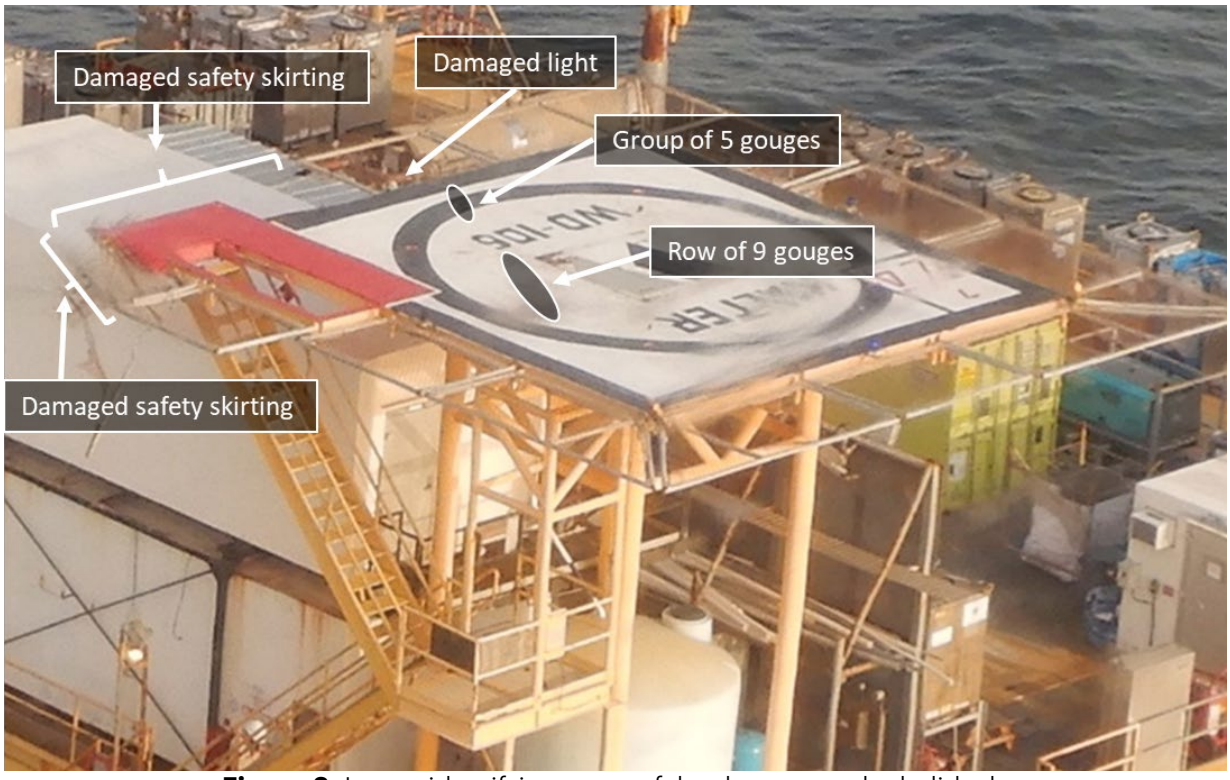

Figure 8. Image identifying some of the damage to the helideck.

Figure 9. Photo showing the row of 9 irregularly spaced but inline gouges in the paint inside the aiming circle.

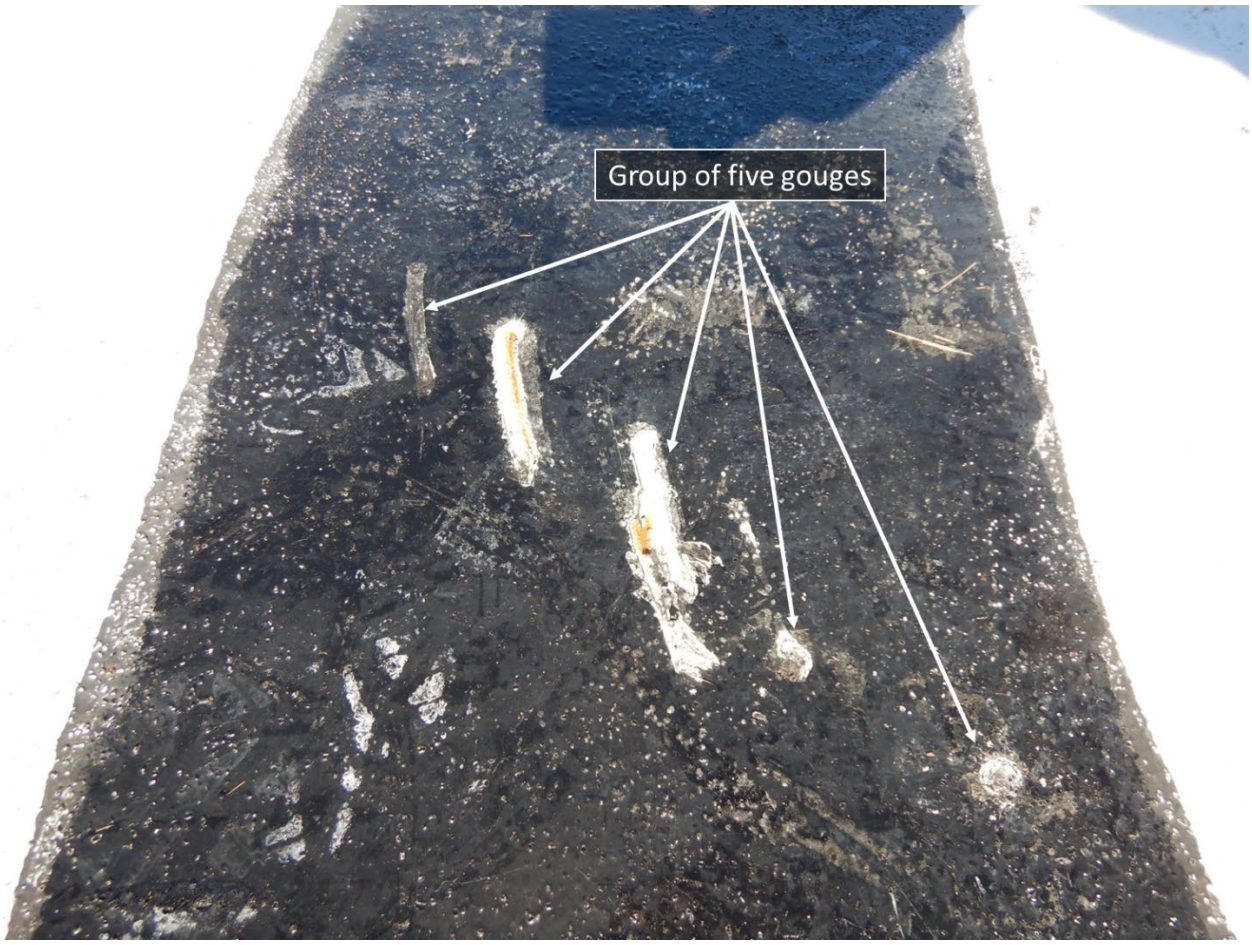

Figure 10. Photo showing the group of five irregularly spaced gouges in the aiming circle paint.

The location of the two gouged areas and the damaged light assembly is shown in Figure 11.

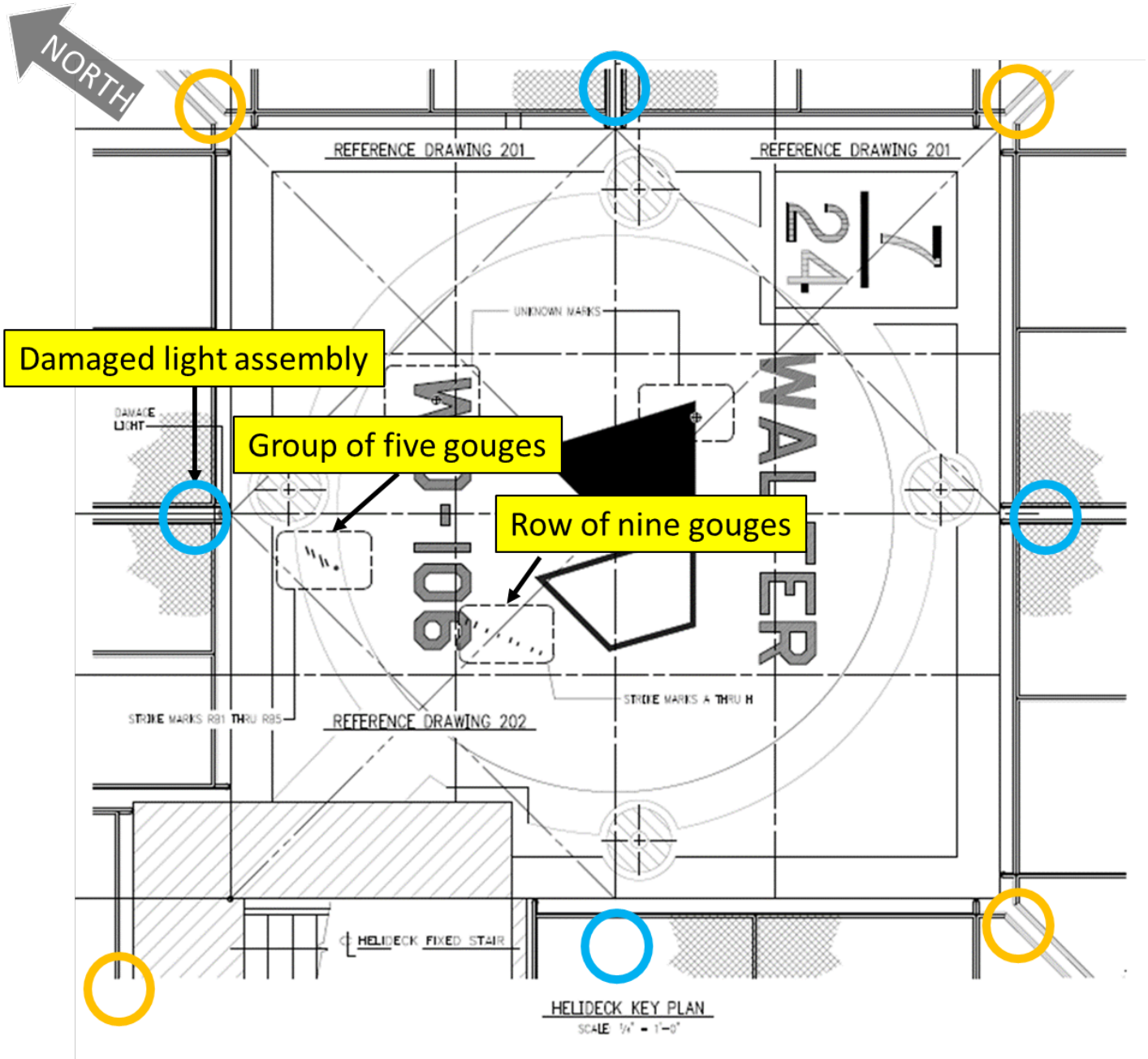

Figure 11. Illustration showing the location of the two groups of gouges in the helideck paint and the location of the damaged light assembly. Illustration provided by Walter Oil and Gas.

A closeup image of the damaged light assembly is shown in Figure 12.

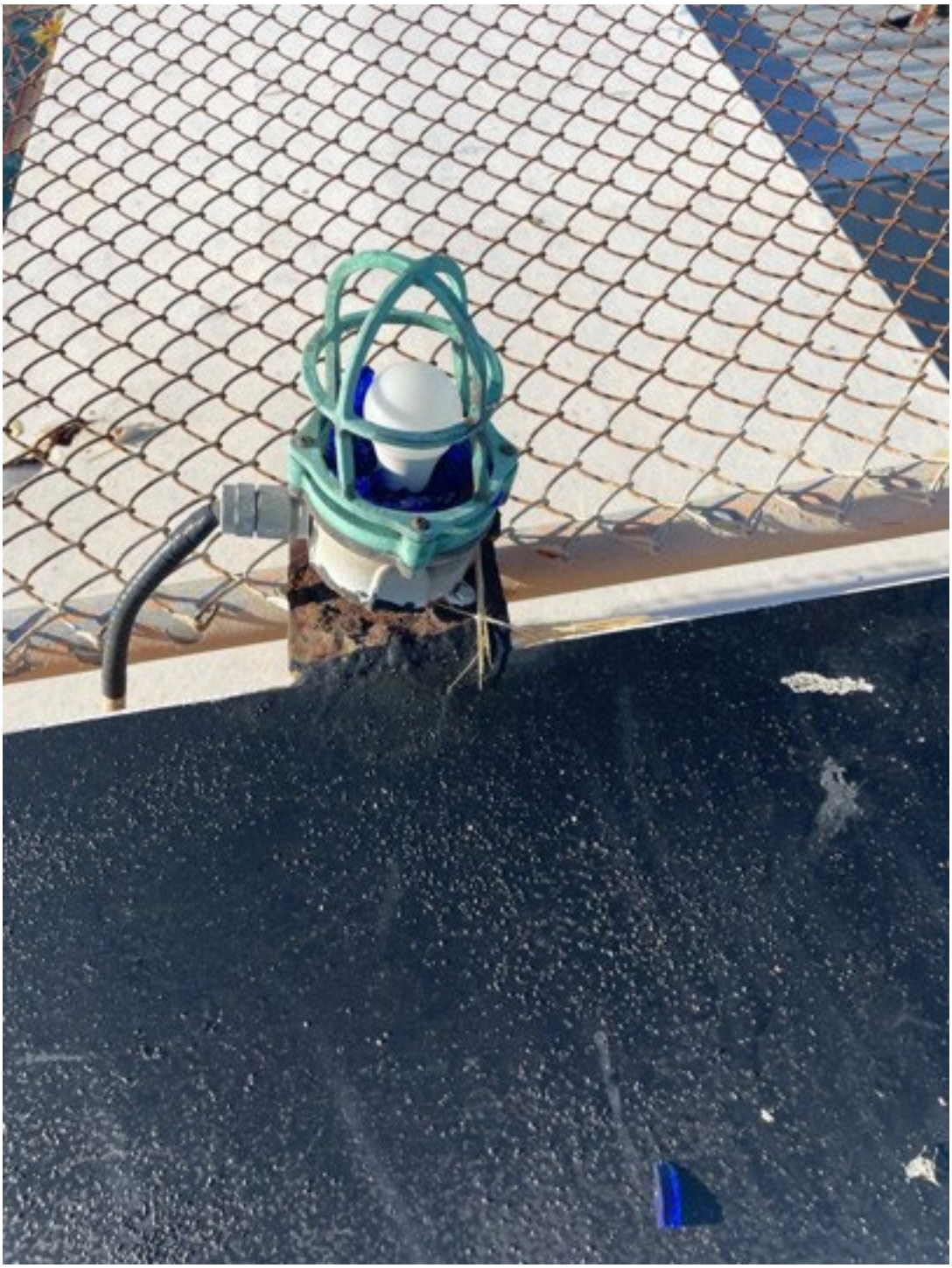

Figure 12. Photo of the northwest elevation, center light, immediately after the accident. Photo courtesy of Walter Oil and Gas.

A closeup photograph of the damaged stairwell paint, the mount for the missing yellow light assembly and the damaged safety skirting is Figure 13.

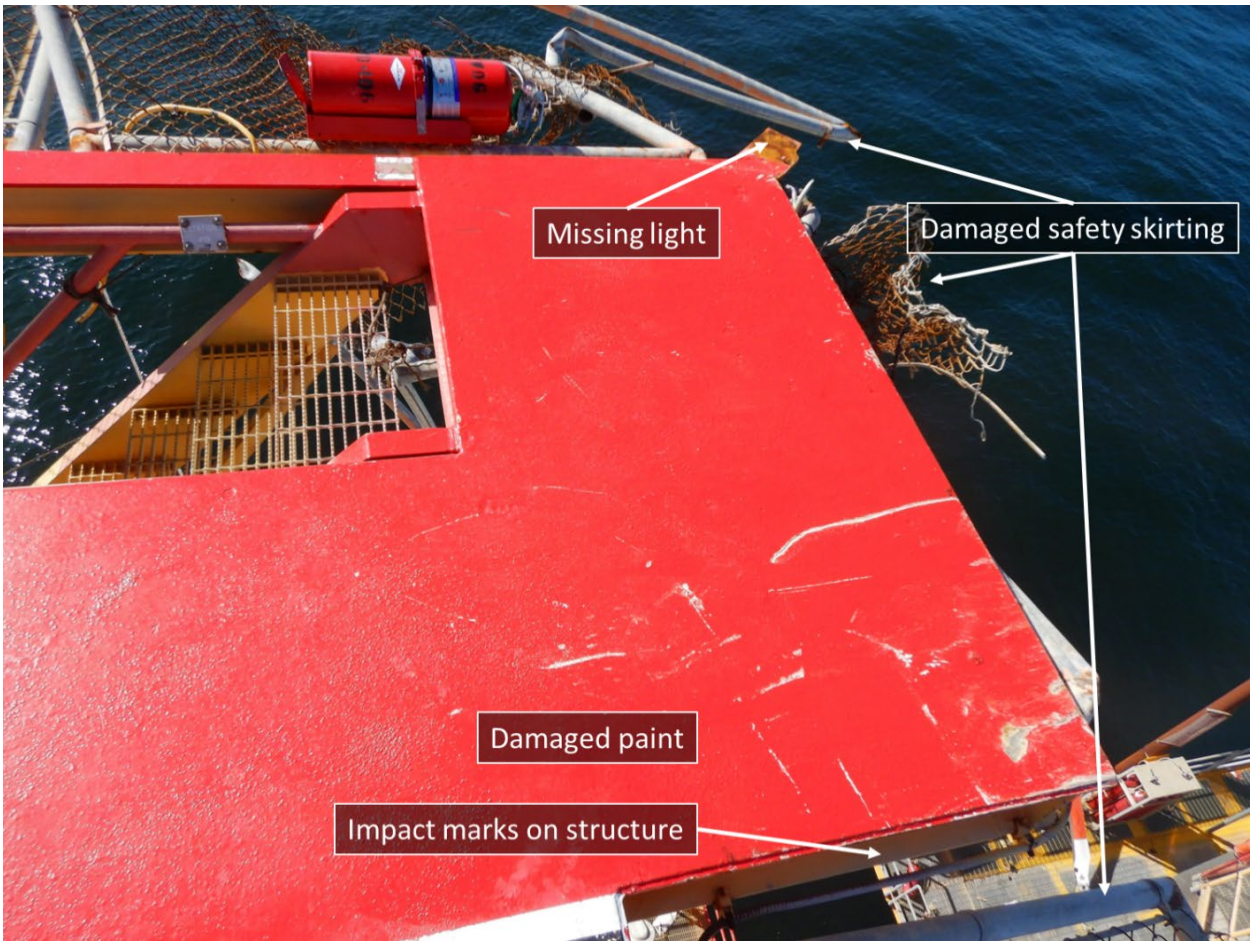

Figure 13. Photo identifying some of the damage around the stairwell area.

8.0 GENERAL OPERATING MANUAL (GOM), MANEUVERS GUIDE AND TRAINING

8.1 GOM

The GOM stated, in part,

"Anything less than rotor diameter will be considered a restricted category helideck, and the pilot may have to reduce load to operate safely. All approaches and landings shall be made to the center of the available landing area when landing to a restricted category helideck. The mast of the helicopter is to be as close to the center of the helideck as possible."

According to the Bell 407 Pilot Operating Handbook, the main rotor diameter is 35 ft. This would place the 24 ft by 24 ft helideck within the restricted category.

The GOM referenced the Helicopter Safety Advisory Conference (HSAC)-Recommended Practices (RP) No. 93-3, The GOM stated, in part,

"The RP also requires that helicopters operating on offshore helidecks must land or park the helicopter with a skid/wheel assembly no closer than 3 feet from the helideck edge." And "Pilots in command of the aircraft will be responsible for complying with HSAC Recommended Practice 93-3 and must verify safe landing room before approaching helideck to land."

8.2 RLC MANEUVERS GUIDE

RLC Maneuvers Guide contained standards for takeoff and landing to platforms and listed the FAA Helicopter Flying Handbook (FAA-H-8083-21) as a reference. The Maneuver Guide identified the standards for an approach to a platform as:

- *As into the wind as possible.*
- *High reconnaissance at 500 ft agl or above.*
- *Floats armed prior to descending below 300 ft agl.*
- *Arrive at the center of the available area with a 3-5 ft hover.*

The RLC Maneuvers Guide identified the standards for takeoff from a platform as:

- *Float pin shall be removed for all over water flights.*
- *Departures must always begin from a stabilized hover and be as into the wind as possible.*
- *Apply slight increase in collective, note positive rate and engine performance.*
- *Apply forward cyclic to transition into forward flight.*
- *As the helicopter moves out of ground effect, maintain altitude, and accelerate to no less than 60 knots.*
- *Do not lose altitude after clearing the platform.*
- *Once 60 knots is achieved, set cruise power, and climb to cruise altitude.*
- *The aircraft may be turned toward, but not away from the wind until 300 ft agl.*

8.3 FAA-H-8083-21 HELICOPTER FLYING HANDBOOK FREFERENCE

The HFH describes a takeoff from a hover as:

"A vertical takeoff to a hover involves flying the helicopter from the ground vertically to a skid height of two to three feet, while maintaining a constant heading. Once the desired skid height is achieved, the helicopter should remain nearly motionless over a reference point at a constant altitude and on a constant heading. The maneuver requires a high degree of concentration and coordination."

8.4 DIRECTOR OF TRAINING ADDITIONAL INFORMATION

According to the DoT, company pilots are trained to land to the center of a helideck, regardless of the size of the helideck. For helidecks with a visible aiming circle, determining if the helicopter is in the center of the aiming circle is done via visual cues from within the cockpit and is demonstrated and trained during initial flight training. According to the DoT, his technique for determining if a helicopter landed in the center of an aiming circle is based upon his specific seated height and his own sight picture. However, the DoT explained that if the anti-torque pedals are over the aiming circle upon landing, the helicopter is in the center of the aiming circle.

The DoT explained that during training, he guides the pilot under training to develop their own sight picture which ensures the helicopter is in the center of the helideck or aiming circle. The DoT stated that this practice included encouraging the pilot to open the door after landing to visually verify that the helicopter is in the center of the helideck or aiming circle. Figure 14 shows an example of an exemplar helicopter situated in the center of a 10 ft diameter aiming circle. The 10 ft diameter aiming circle, highlighted in orange, is visible under the anti-torque pedals.

Figure 14. Photo captured with the camera positioned near the installed Appareo video recorder. The helicopter is positioned in the center of a 10 ft diameter aiming circle. The aiming circle is highlighted in orange to emphasize its location in the image only.

The DoT explained that the company trains pilots so that a takeoff is not a singular event, rather it is a multi-stepped process that begins with:

- Apply power until the helicopter is light on the skids.
- Bias the weight on the heels of the skids.
- Find equilibrium.
- Lift straight up to a 3-5 ft hover check and stop.
- The pilot would then glance at the gauges, and then lift off or reposition.

The DoT explained that if the helicopter is lifted in the multi-step process, drift is not a concern during the takeoff phase.

9.0 ADDITIONAL WD-106 DATA

An exemplar Bell 407 helicopter was used to capture additional factual data. The exemplar helicopter's Appareo video recorder Field of view (FOV) was calibrated to match the accident helicopter's Appareo FOV. The helicopter was then relocated to

WD-106. The helicopter was parked in the center of the 10 ft diameter aiming circle, on a heading of 145° magnetic or about the 1 o'clock position. With the camera placed alongside the Appareo recorder, a photo was captured to show the view of the aiming circle from the right-side pilot's chin bubble, as shown in Figure 15. The captured image showed the aiming circle under the anti-torque pedals.

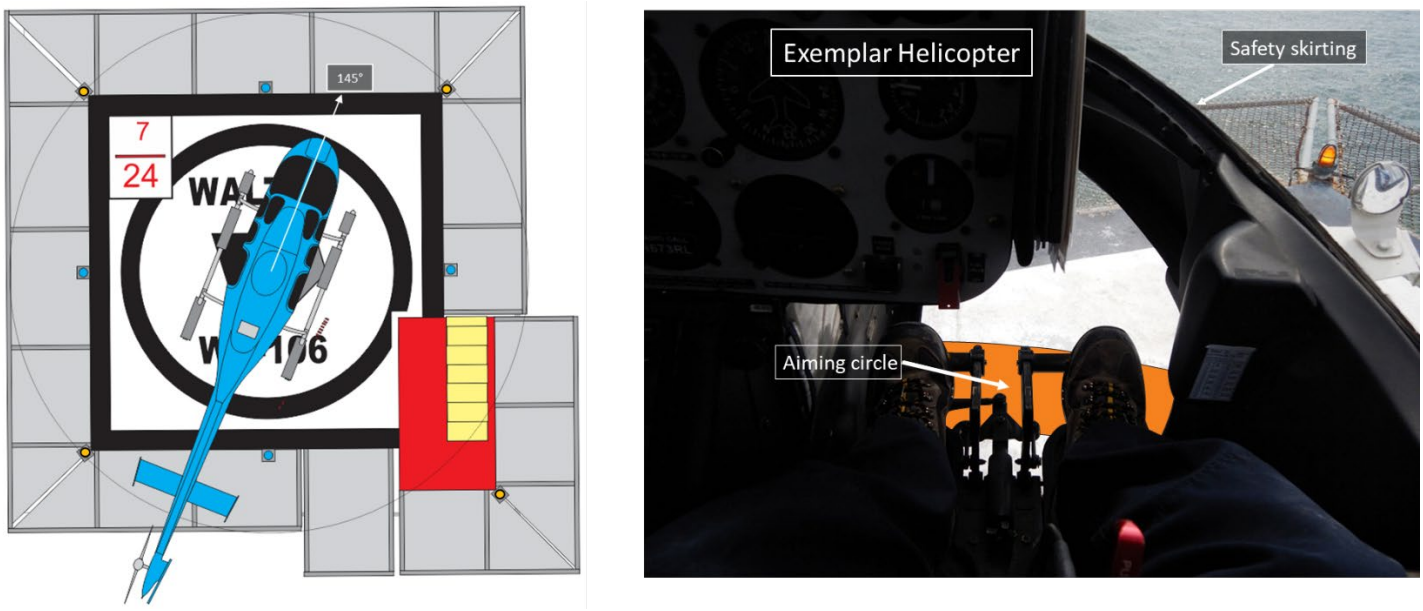

Figure 15. Image captured while the exemplar helicopter was in the center of the aiming circle and the right-side chin bubble showing the location of the aiming circle (highlighted in orange) under the anti-torque pedals. The illustration shows the helicopter's position and orientation.

While the exemplar helicopter was positioned in the center of the aiming circle, a photo was captured from the left-side, forward-facing, aft seat. The camera was oriented toward the northeast elevation, as shown on the right side of Figure 16. The left side of Figure 16 was an image captured by the accident passenger seated in the left-side forward-facing aft seat.

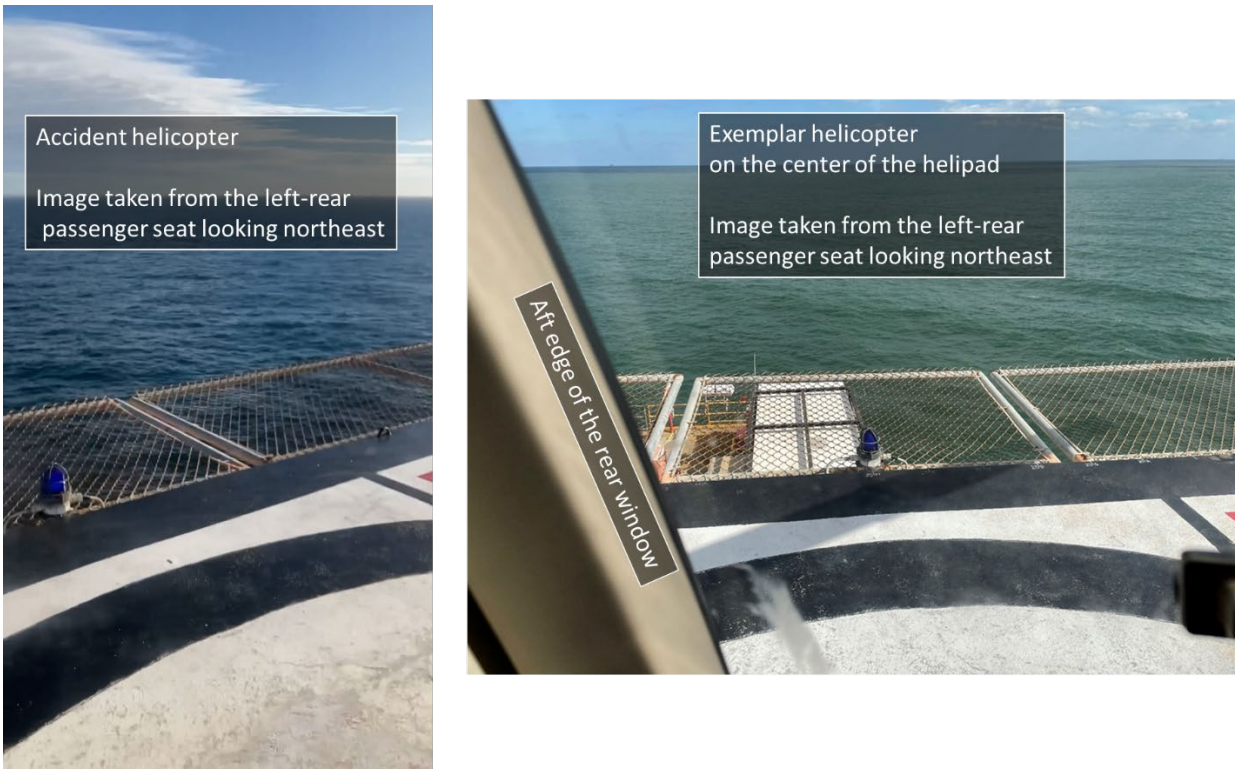

Figure 16. Left image that was captured by the accident passenger in the left-rear passenger seat. Right image captured by the NTSB passenger seated in the left-rear passenger seat.

The exemplar helicopter was then repositioned straight aft to match the calibrated exemplar recorder FOV to the accident recorder's FOV, as shown in Figure 17.

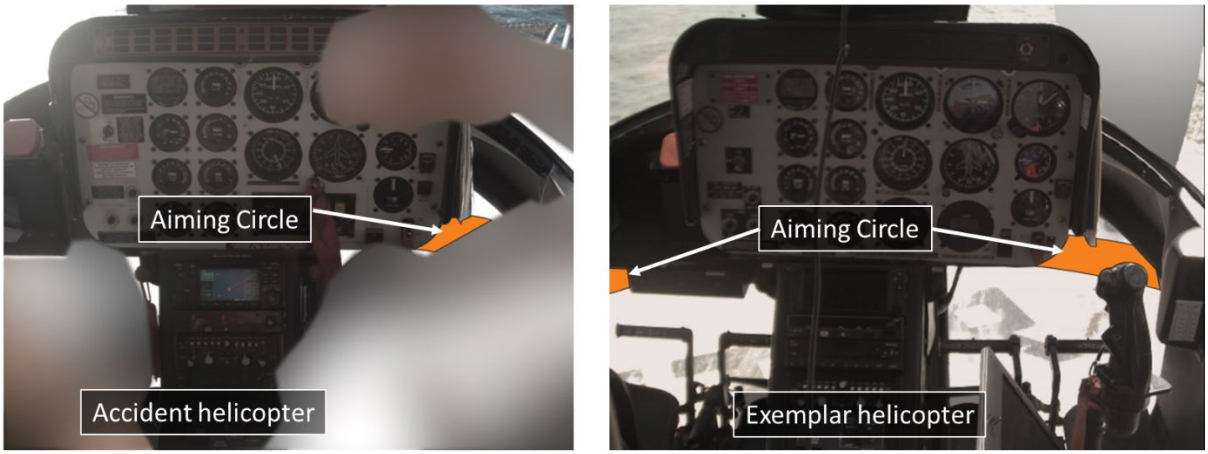

Figure 17. Side by side comparison of the accident Appareo's FOV (left) and the exemplar Appareo's FOV (right). Aiming circles are highlighted in orange.

Moving the exemplar helicopter straight aft to match the accident FOV resulted in the right skid extending past the edge of the helideck, while the left skid remained completely on the helideck, as shown in Figure 18.

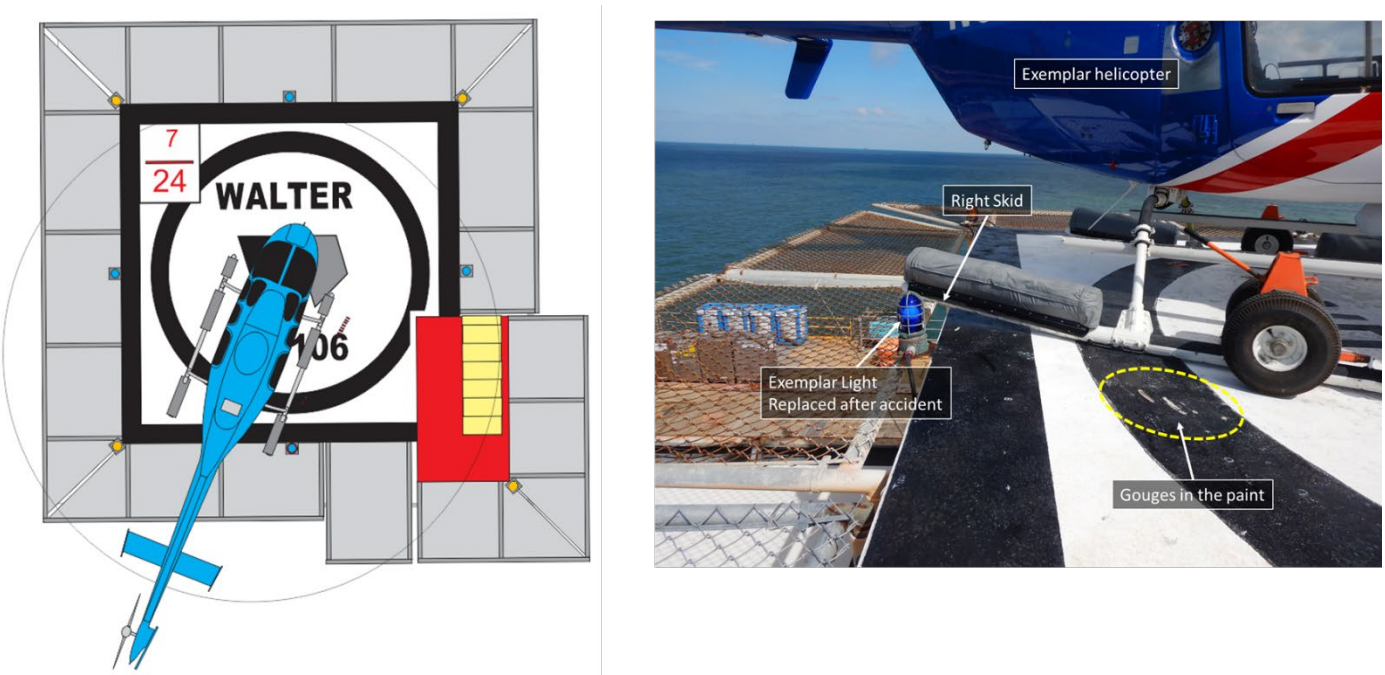

Figure 18. Image showing the aft section of the exemplar helicopter's right skid is beyond the edge of the northwest elevation of the helideck. The illustration shows the helicopter's location on the helideck.

When compared to the group of five gouges in the aiming circle, five wear shoe mounting bolts were near the gouges and matched the spacing between the gouges, as shown in Figure 19 and Figure 20.

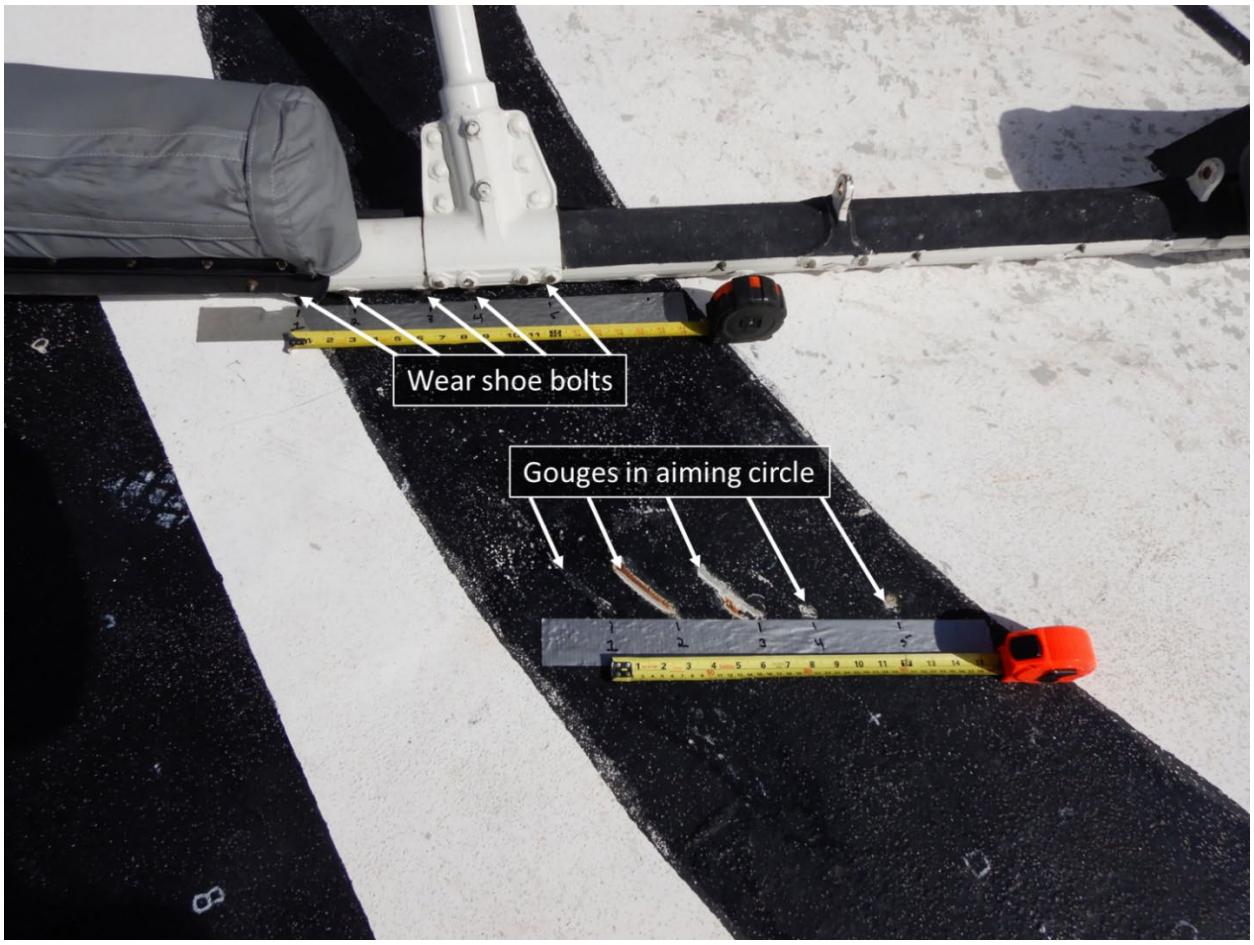

Figure 19. Image of an exemplar right skid showing the five wear shoe mounting bolts that matched the spacing of the group of five irregularly spaced gouges in the paint.

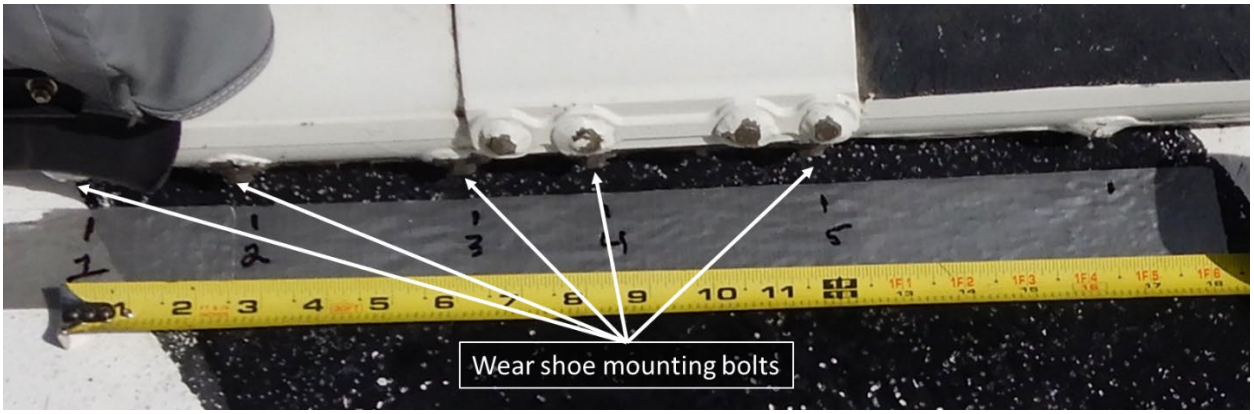

Figure 20. Close up of the five matching wear shoe mounting bolts underneath the aft cross tube saddle.

With the exemplar helicopter still in the position that matched the accident helicopter's FOV, the middle section of the right skid was compared to the row of nine irregularly spaced but inline gouges to the paint. A section of nine wear shoe mounting bolts were near the gouges and matched the spacing of the gouges, as

shown in Figure 21. The spacing of the wear shoe bolts was marked onto a section of tape and the spacing of the gouges in the paint were marked onto a section of tape. When placed side by side, the spacing was nearly identical, as shown in Figure 22.

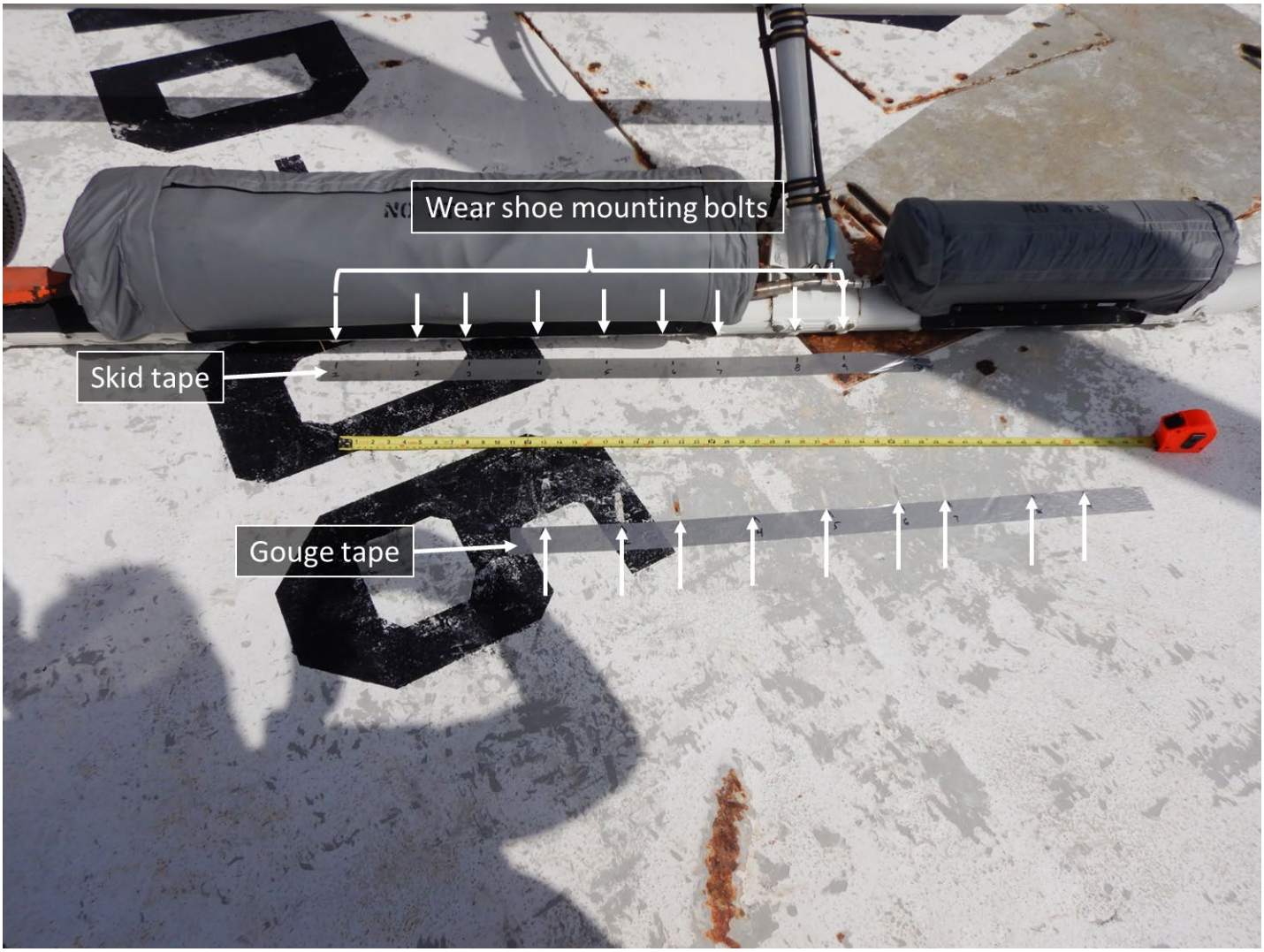

Figure 21. Photo showing the row of nine irregularly spaced but inline gouges in the paint alongside the matching wear shoe mounting hardware.

Figure 22. Photo showing the spacing of the wear shoe bolts and the paint gouges.

10.0 COMPANY INFORMATION

Rotorcraft Leasing Company (RLC), located in Broussard, Louisiana, is a privately owned company operating under air carrier certificate number YTRA264L. The FAA issued the company's on-demand IFR and VFR certificate on November 1, 1998, which is managed by the FAA Baton Rouge Flight Standards District Office, Baton Rouge, Louisiana. Company management consisted of the Chief Executive Officer, Director of Maintenance, Director of Operations, Chief Inspector, Director of Safety, Maintenance manager, Chief Pilot, Assistant Director of Training, Field Base manager, and Operations Supervisor. At the time of the accident, RLC had 140 employees, including 85 pilots, and operated 10 Bell 206-L series helicopters, 21 Bell 407, and 8 S-76A helicopters. The company conducted offshore oil industry support flights.

The Operations Specifications limited the Bell 407 helicopter to only day/night VFR operations.

RLC used a General Operations Manual dated February 2, 2022, Revision 5. The document was to be reviewed and revised annually, and a copy was to be carried on all flights to be available for use by ground and other personnel as required.

10.1 RLC MANAGEMENT

At the time of the accident RLC employed the following personnel in the identified managerial positions, as shown if Figure 23.

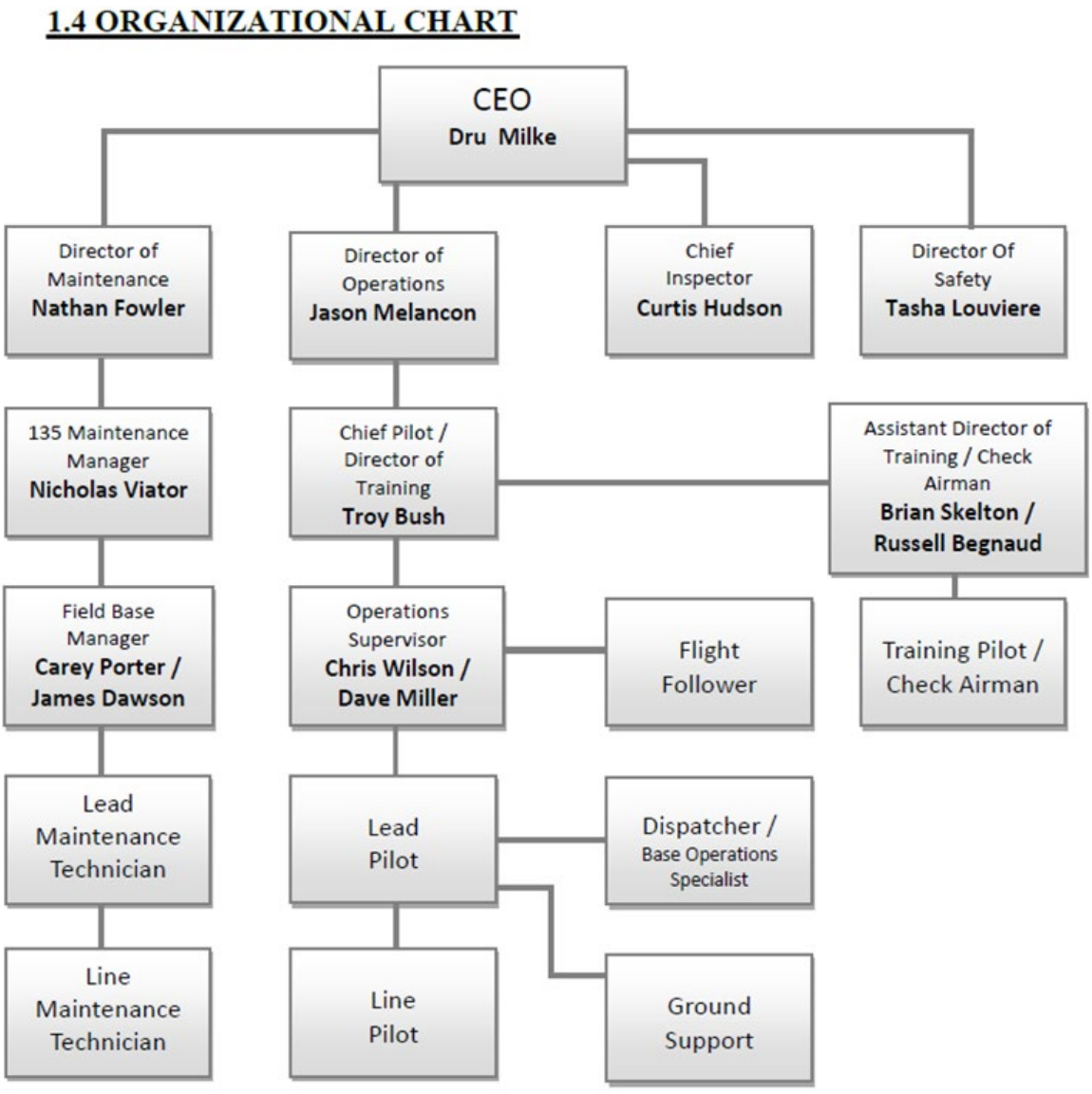

Figure 23. RLC organizational chart.

10.2 OPERATIONAL CONTROL

RLC's Operational Control guidance was outline in the Operations Specifications, paragraph A008.

The GOM addressed Operational Control in Chapter 1, paragraphs 1.6 through 1.9.4

10.2.1 MANAGEMENT PERSONNEL RESPONSIBILITIES, AND AUTHORITY

The following personnel are listed in the GOM, paragraphs 1.5.1 through 1.5.8, along with their respective responsibilities.

- Director of Operations
- Chief Pilot
- Director of Maintenance
- Operations Supervisor
- Flight Follower
- Lead Pilot
- Pilot in Command
- Director of Training

11.0 FLIGHT TIME LIMITATIONS

The GOM, Chapter 21.12 Flight Time Limitations states, in part,

"Flight crewmembers are required to be available for duty at all times except during required rest periods or scheduled vacations." And "No crewmember will be scheduled so that his flight and duty time will exceed standards set forth in 14 CFR Part 135, §§135.263 and 135.267…"

The GOM detailed flight time and rest periods nearly verbatim to 135.263 and 135.267.

As mentioned previously, on December 28, 2022, the day before his first day of duty, the pilot returned from a vacation in Brazil. According to a National Travel Agency representative, the non-stop flight from GAU to ATL was 9 hours, 20 minutes followed by a 1 hour, 50-minute flight from ATL to LFT. The pilot's arrival time to his duty station of Galliano, Louisiana, could not be determined. The lead pilot stated that the pilot arrived for work at 05:30 on the day of the accident. He recalled that his communication with the pilot was jovial and that the pilot appeared to be very happy. The Chief Pilot for RLC was present at the Galliano facility and recalled speaking to the pilot and that their conversation was normal.

In a discussion with the DoT, he mentioned that RLC policy is that a pilot coming off cycle is expected to have his room cleaned and available for his counterpart to arrive the day prior, so that the pilot coming on duty has a place to rest in preparation for his first day back on-duty.

Regarding rest periods for pilots, the DoT mentioned that the GOM is the document RLC follows regarding flight time and rest. He added that pilots are free to do what they wish on their off-duty cycle and that they are expected to arrive on their next on-duty cycle rested and ready to fly.

12.0 ADDITIONAL INFORMATION

12.1 DYNAMIC ROLLOVER

According to the FAA Helicopter Flying Handbook, FAA-H-8083-21B, a helicopter is susceptible to a lateral rolling tendency, called dynamic rollover, when it is in contact with the surface during takeoffs or landings. For dynamic rollover to occur, some factors must first cause the helicopter to roll and/or pivot around a skid or landing gear wheel, until its critical rollover angle is reached. The angle at which dynamic rollover occurs varies based on helicopter type. Then, beyond this critical angle, main rotor thrust continues the roll and recovery is impossible. Additionally, after this critical angle is achieved, the cyclic does not have sufficient range of control to eliminate the thrust component and convert it to lift. If the critical rollover angle is exceeded, the helicopter rolls on its side regardless of the cyclic corrections made.

Dynamic rollover begins when the helicopter starts to pivot laterally around its skid or wheel. For dynamic rollover to occur the following three factors must be present:

1. A rolling moment
2. A pivot point other than the helicopter's normal CG
3. Thrust greater than weight

This can occur for a variety of reasons, including the failure to remove a tie down or skid-securing device, or if the skid or wheel contacts a fixed object while hovering sideward, or if the gear is stuck in ice, soft asphalt, or mud. Dynamic rollover may also occur if you use an improper landing or takeoff technique or while performing slope operations. Whatever the cause, dynamic rollover is possible if a pilot uses improper corrective technique. The document further explained that the correct recovery technique is to remove thrust and lower the collective control before the helicopter enters a dynamic rollover.

12.2 SAFETY SUGGESTIONS

During the investigation, NTSB staff made the following safety suggestions, which were accepted and implemented by the operator (RLC).

- Paint aiming circles on the helipads located at the RLC property in Broussard, Louisiana; so that pilots under training have additional opportunities to train on landing in the center of an aiming circle.

- Do not allow passengers to place the front left-seat headset on the windscreen center piece and leave them there during flight.

F. LIST OF ATTACHMENTS

1. Outbound Flight Manifest
2. RLC Light Ship Manifest (FSO)
3. American Petroleum Institute 2L 3rd Edition (Excerpt)
4. Pilot's History of Takeoff and Landings from Platforms
5. Emails
6. Passenger Data for Accident Flight
7. Pilot's Resume
8. Pilot's Training and Duty Records
9. RLC Training and Maneuvers Manual (Platform Takeoffs and Landings)
10. RLC General Operations Manual (Excerpts)
11. WD-106 Engineering Drawing
12. Interviews