

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ANC23FA056

Wreckage Examination

July 30, 2023

TABLE OF CONTENTS

A. ACCIDENT.....	3
B. FIELD NOTES	3
C. SUMMARY	3
D. DETAILS OF THE EXAMINATION.....	4
1.0 ACCIDENT SITE	4
2.0 AIRFRAME EXAMINATION.....	10
2.1 Fuselage.....	10
2.2 Tail Boom	16
2.3 Rotor Blades and Tail Rotor blades	28
2.4 Landing Gear.....	33
2.5 Flight controls/Hydraulic.....	43
2.6 Survivability.....	49
2.7 Fuel/Fuel System.....	52
2.8 Transmission.....	53
3.0 ENGINE EXAMINATION	63
4.0 PILOT INFORMATION	66
5.0 METEOROLOGICAL INFORMATION -	67

A. ACCIDENT

Location: Wainwright Ak
Date: July 20, 2023
Time: 1904L

Helicopter: N311MH Bell 206-L4

B. FIELD NOTES

IIC	Mark Ward NTSB
Subject Matter Expert	Nick Shepler Rolls Royce Engines
Subject Matter Expert	Mark Stuntzner Bell Flight Safety
Subject Matter Expert	Matt McLuckie Bell Flight Safety
Party Member	Dennis Busch Maritime Helicopters

C. SUMMARY

On July 20, 2023, about 1904 Alaska daylight time, a Bell 206L-4 helicopter, N311MH, was destroyed when it was involved in an accident near Wainwright, Alaska. The pilot and three passengers were fatally injured. The helicopter was operated by the pilot as a Title 14 Code of Federal Regulations Part 135 on-demand charter flight.

The Helicopter was owned and operated by Maritime Helicopters, Homer, Alaska, and according to the director of operations, the helicopter was under contract to the State of Alaska's Department of Natural Resources (DNR) being used to transport scientific crews to various remote locations within the North Slope region.

The Alaskan North Slope is bounded on the north by the Beaufort Sea and runs from the Canadian border to the maritime boundary with Russia in the west. The North Slope region includes a portion of the Arctic National Wildlife Refuge (ANWR) and National Petroleum Reserve-Alaska (NPRA).

The operator's director of operations reported that the accident helicopter and DNR crew members were based in Utqiagvik, Alaska for the duration of the contract. He added that when the accident helicopter departed from Utqiagvik, about 1801,

the anticipated route included a brief stop at the Atqasuk Airport, Atqasuk, Alaska, then continuing on to a remote site(s) to the east of Wainwright before ultimately returning to Utqiagvik. The accident helicopter was expected to return to Utqiagvik by 2030. When the helicopter did not arrive back in Utqiagvik, a North Slope Borough (NSB) Search and Rescue Sikorsky S-92 helicopter was dispatched to search for the missing helicopter.

At 0315 (7/21) NSB search and rescue crews found the partially submerged, fragmented helicopter wreckage in the shallow waters of Lake Itinik located about 34 miles east of Wainwright. The accident helicopter was equipped with a Honeywell Sky Connect Tracker system enabling real-time, flight following capabilities. The Sky Connect Tracker system broadcasts flight status data in 3-minute intervals to satellite-based receivers.

A review of archived Sky Connect data revealed that the accident helicopter departed from Utqiagvik at 1801, then it proceeded southwest to the Atqasuk Airport. After a brief stop at the Atqasuk Airport, the helicopter then departed, and it begins to travel in a northwesterly direction. The Sky Connect data ends as the helicopter passed over the southeastern shoreline of Lake Itinik, while continuing to travel in a northwest direction, at an altitude of 144 ft above mean sea level, with a ground speed of 93 knots.

Lake Itinik is a large, oval shaped, arctic lake, measuring more than three miles across in some areas. The terrain around Lake Itinik consists of flat, featureless, arctic tundra-covered terrain. The elevation of Lake Itinik is 56 ft above mean sea level.

D. DETAILS OF THE EXAMINATION

1.0 Accident Site

The accident site is in the middle of a large lake in about 6 feet of water. N70.66114 W158.564989. Underwater visibility was very poor. The bottom of the lake had a thick, muddy sediment layer about 2 feet deep. The helicopter was about 2 miles from the last automatic location sent by a Honeywell Sky Connect system. Along the same reported heading.



Figure 1 View of accident site, Lake Itinik.



Figure 2 Route of helicopter provided by Honeywell Sky Connect Tracker System

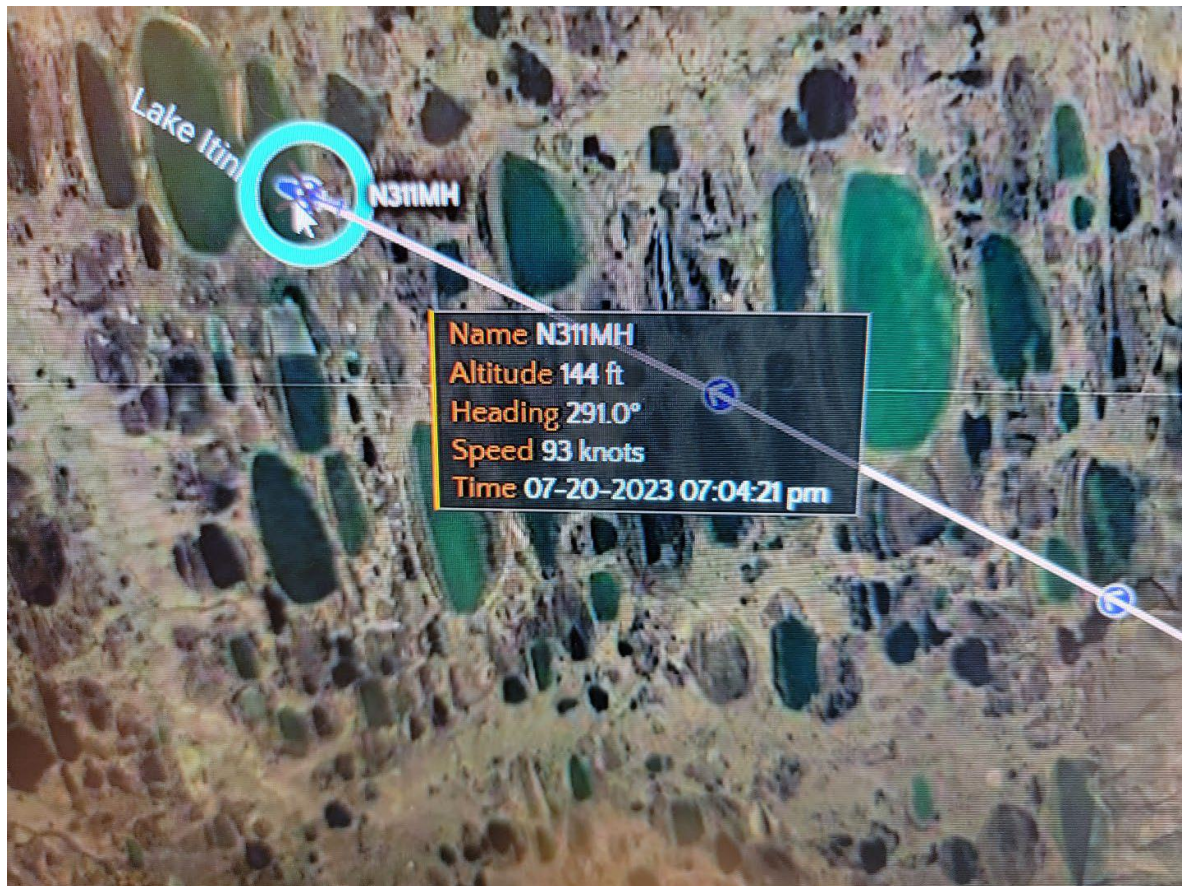


Figure 3 Last position report of the accident helicopter.



Figure 4 View of accident helicopter at accident site.

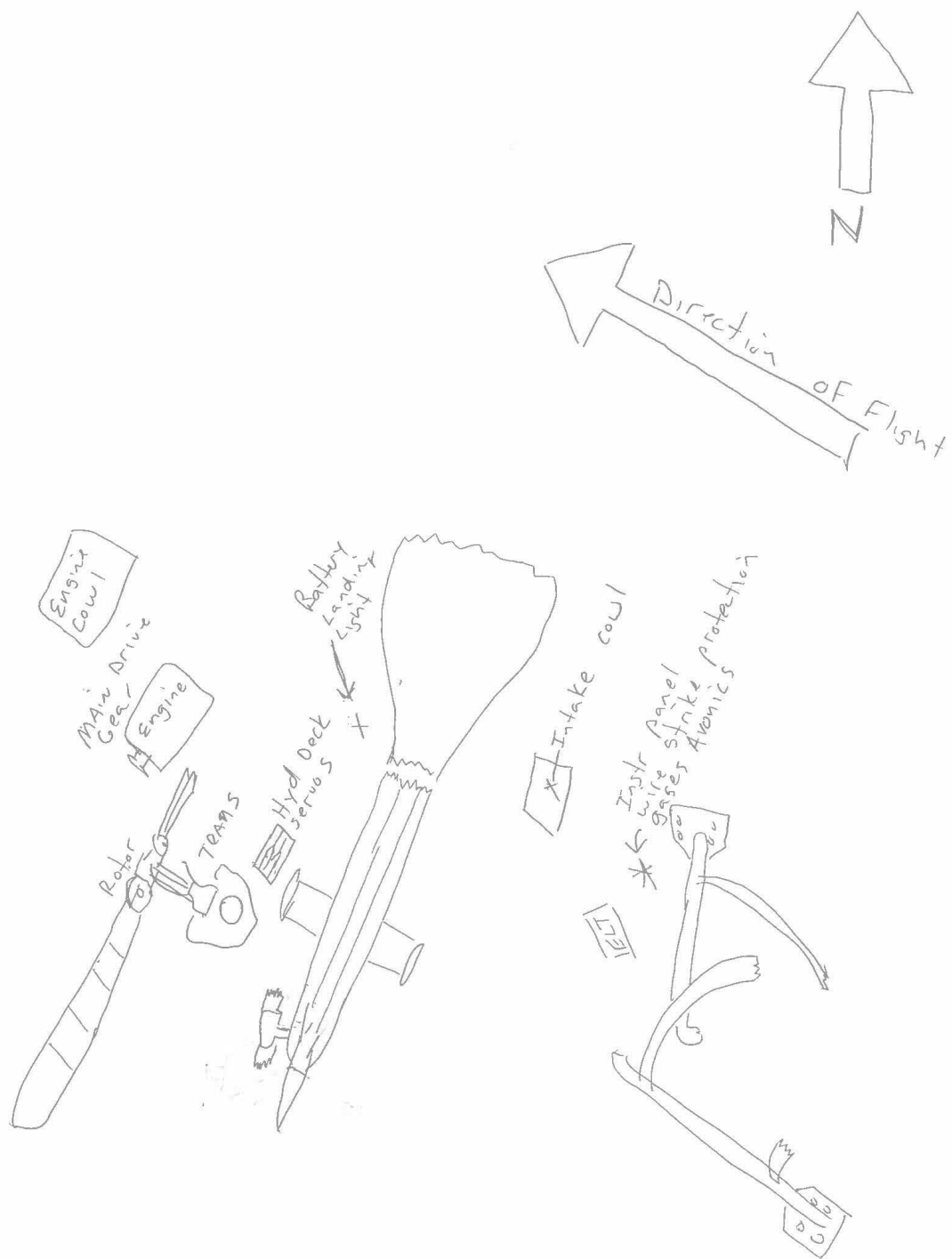


Figure 5 Wreckage site diagram.

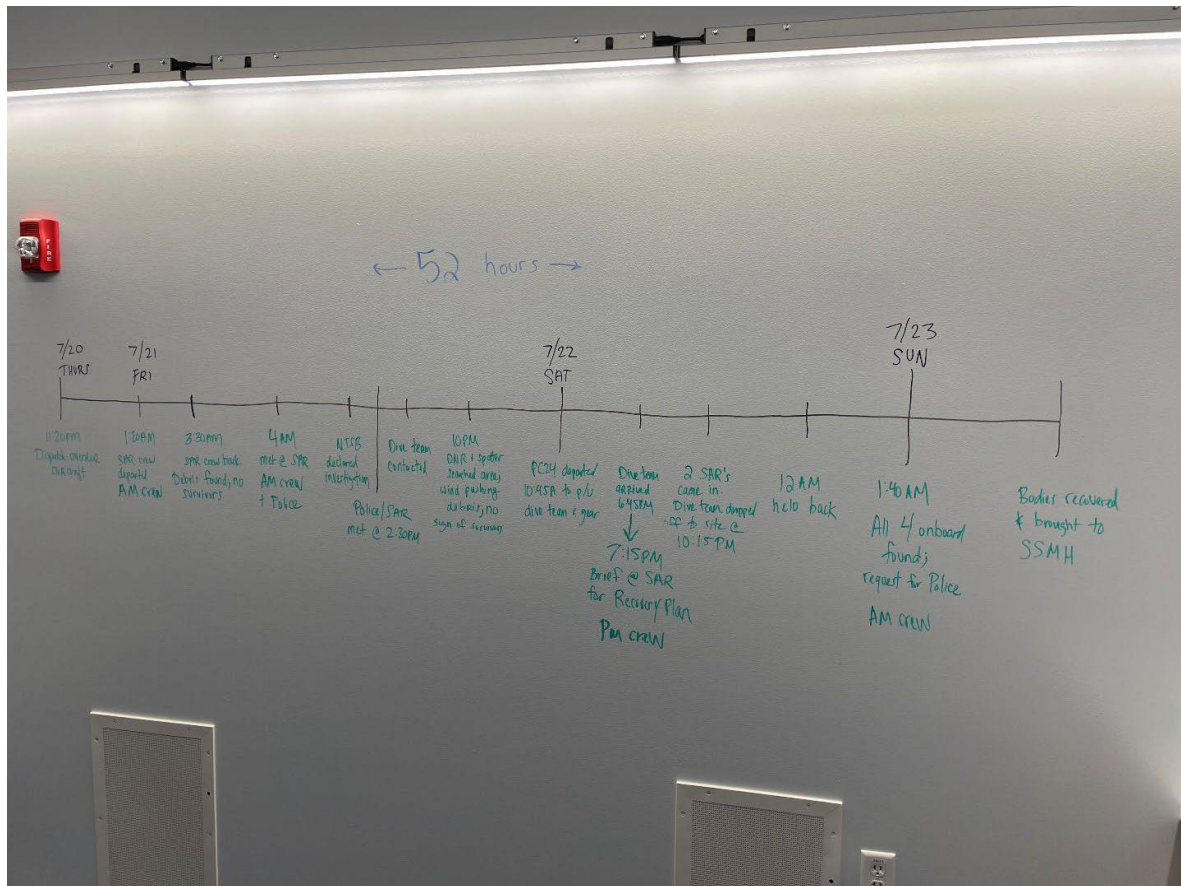


Figure 6 Search and Rescue timeline.

2.0 Airframe Examination

2.1 Fuselage

The fuselage was fragmented from impact forces with the water. All observed fractures were consistent with overload forces from impact. The nose, instrument panel, pilot door were not recovered. Evidence of front to rear crushing consistent with frontal water impact forces was observed at the cockpit seat structure, copilot door, and right cabin door. The aft fuselage was relatively intact but heavily damaged from impact forces. The four tailboom attachment bolts and nuts were all solidly attached. The tailboom exhibited an impact overload fracture just aft of the intercostal support at the forward end of the tailboom.

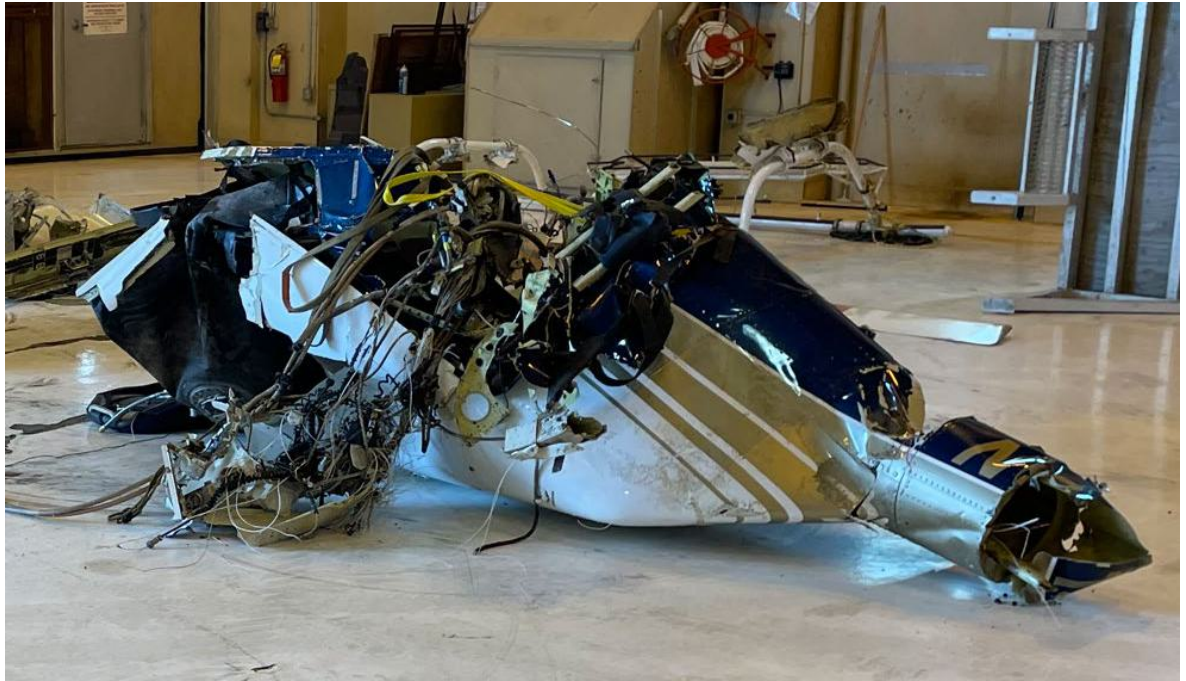


Figure 7 Left side of accident helicopter fuselage.



Figure 8 Top view of accident helicopter fuselage.



Figure 9 View of accident helicopter's cockpit floor and seat location.



Figure 10 Right side view of accident helicopter fuselage.



Figure 11 Right side rear passenger door.



Figure 12 Left front passenger door.



Figure 13 Left side baggage compartment door.

2.2 Tail Boom

No pre-impact anomalies were observed in the tail rotor, elevator flight controls or tail rotor driveshaft system and all observed fractures were consistent with overload impact forces. Except for a fractured tail rotor control tube found impaled into the floor of the forward cockpit area, all control tubes, bellcranks, and pedals were missing from the cockpit to the aft fuselage area above the cabin forward facing seats. The forward fractured long tail rotor control tube was manipulated by hand and free tail rotor blade pitch change movement was observed. The steel forward shaft under the engine remained connected to the system through the Thomas

coupling (flexible steel plates) and rotated freely by hand through the freewheeling unit. The aft splined end of the steel shaft was disconnected from the oil cooler shaft splines consistent with airframe fracturing at impact. Both oil cooler shaft bearings rotated freely, the oil cooler cage was distorted from impact forces and both sets of male splines at the forward and aft end of the oil cooler were intact. The first tail rotor driveshaft on the tailboom was fractured from overload impact forces just forward of where the tailboom was fractured. All driveshaft segments on the tailboom rotated freely by hand and corresponding rotation to the tail rotor blades through the tail rotor gearbox was observed. No unusual noises were heard when the tail rotor gearbox was rotating. All Thomas couplings and hanger bearings on the tailboom were intact. Tail rotor gearbox support fractures were observed at both the left forward and left aft locations where the gearbox attaches consistent with overload forces. No chips were observed on the tail rotor gearbox chip detector. Remnants of oil were observed in the gearbox.



Figure 14 Left rear view of the tailboom.



Figure 15 Left side view of the tailboom.



Figure 16 Rear view of tailboom.



Figure 17 Right rear view of the tailboom.



Figure 18 Right rear view of the tailboom.



Figure 19 Right view of the tailboom.



Figure 20 View of tail rotor driveshaft.



Figure 21View of tail rotor.



Figure 23 Above view of the tail rotor gear box.

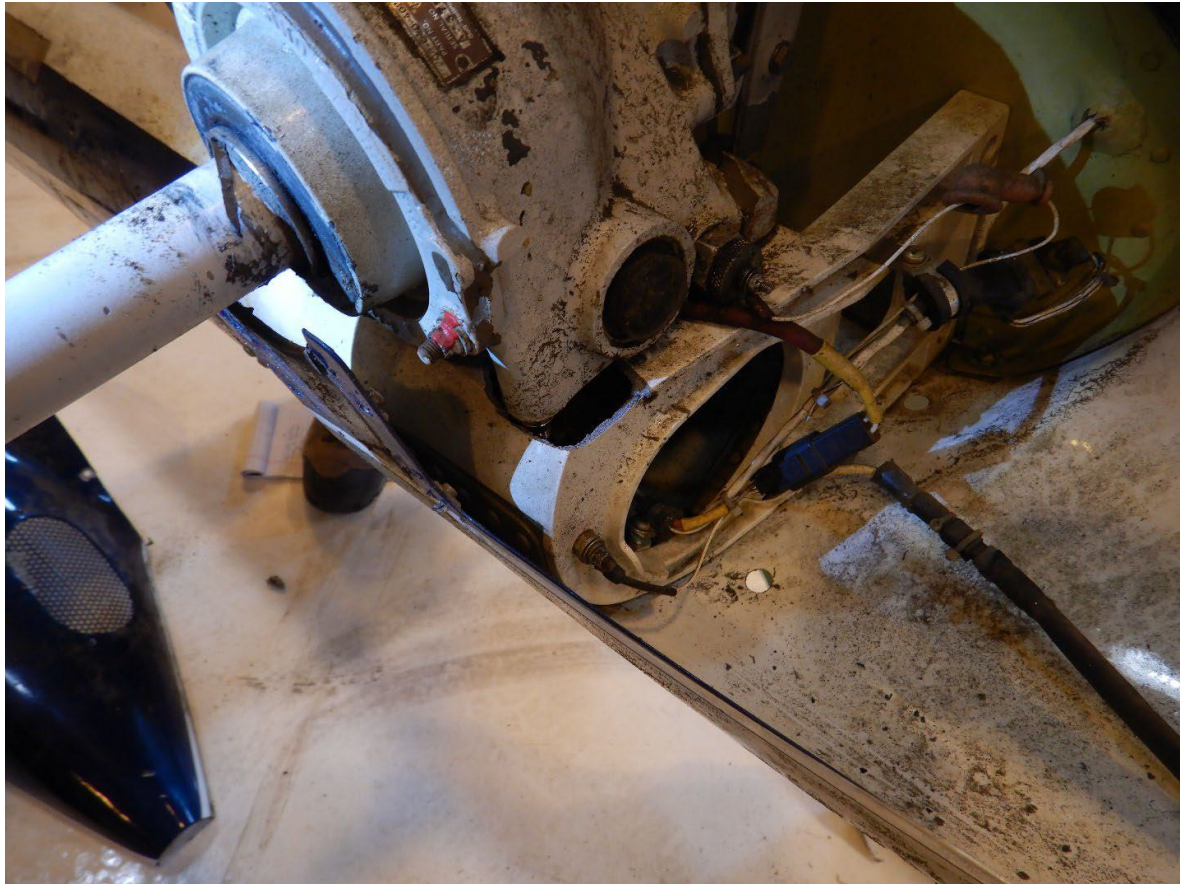


Figure 24 View of impact fractures on the tail rotor gear box.



Figure 25 View of tail rotor chip detector.

2.3 Rotor Blades and Tail Rotor blades

No pre-impact anomalies were observed in the main rotor hub and blades. Both blades remained connected to the hub at the blade grips. The blade grips and pitch horns all remained intact and attached. One blade was fractured at the outboard doublers consistent with impact forces as the first blade made contact with the water surface, under power. Outboard sections of this blade were not recovered. The other blade was cut during recovery approximately $\frac{1}{4}$ of the way from the blade grip. This blade was relatively intact from root to tip with a slight bend opposite direction of rotation from impact forces while rotating.

Both tail rotor blades were fractured chordwise in overload consistent with power applied at impact. One tail rotor blade fractured at approximately 6" from its base. The other blade was fractured near its base was not recovered.



Figure 26 Top view of main rotor blade.

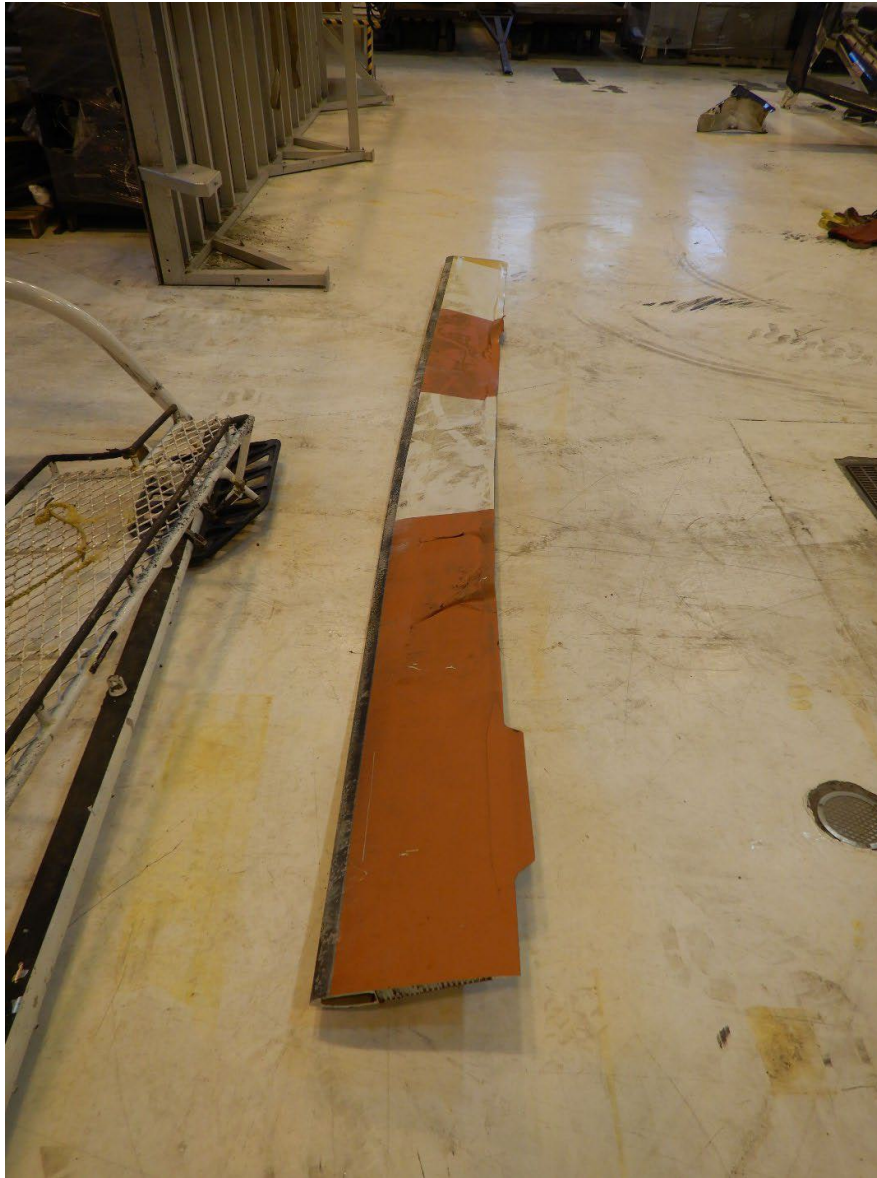


Figure 27 Top view of main rotor blade.



Figure 28 View looking down the blade from the cut off section to the tip.



Figure 29 View of side A of the recovered tail rotor blade.



Figure 30 View of side B of the recovered tail rotor blade.

2.4 Landing Gear

No pre-impact anomalies were found in the landing gear and all fractures were consistent with overload fractures. The landing gear was found close to the main wreckage in the lake.



Figure 31 Front view of landing gear.



Figure 32 Rear view of the landing gear.



Figure 33 Left rear view of the landing gear.



Figure 34 Front crossover tube of the landing gear's left attachment point.



Figure 35 Front crossover tube of the landing gear's right attachment point.



Figure 36 Right side view of the rear landing gear attachment points.



Figure 37 Rear view of the rear landing gear right attachment point.



Figure 38 Rear view of the landing gear left attachment point.



Figure 39 View of the fracture between the left landing gear skid and the rear crossover tube.



Figure 40 View of the fracture between the right landing gear skid and the front crossover tube.

2.5 Flight controls/Hydraulic

No pre-impact anomalies were observed in the main rotor flight controls and hydraulics and all observed fractures were consistent with overload forces at impact. Most of the main rotor flight controls were missing and not recovered and all fractures were consistent with overload at impact. The forward and mid-fuselage were highly fragmented and several parts of the fuselage, including the vertical tunnel (broom closet), where the controls transit, were not recovered. The collective stick, cyclic stick, and anti-torque tail rotor pedals were not recovered. The cyclic stick was fractured at its base consistent with overload forces. The three main rotor servos were found impact damaged but relatively intact. All three servo bodies were able to be moved by hand through their respective servo pistons. The servo support remained attached to fractured roof structure. The servo manifold exhibited several fractured lines consistent with overload fractures. The connection from the servo input valve lever arms to their respective wiredrive assemblies were all intact with no evidence of joint looseness observed. The outer ring rotating swashplate rotated freely by hand. The swashplate support was fractured near its base as result of the mast bending just above the transmission top case from impact forces. One main

rotor pitch change link (PCL) was fractured consistent with overload forces in the middle of the link and at the bottom of the link near the bottom clevis insert. This PCL was associated with the main rotor blade that fractured from water impact forces. The other PCL was bent but not fractured.

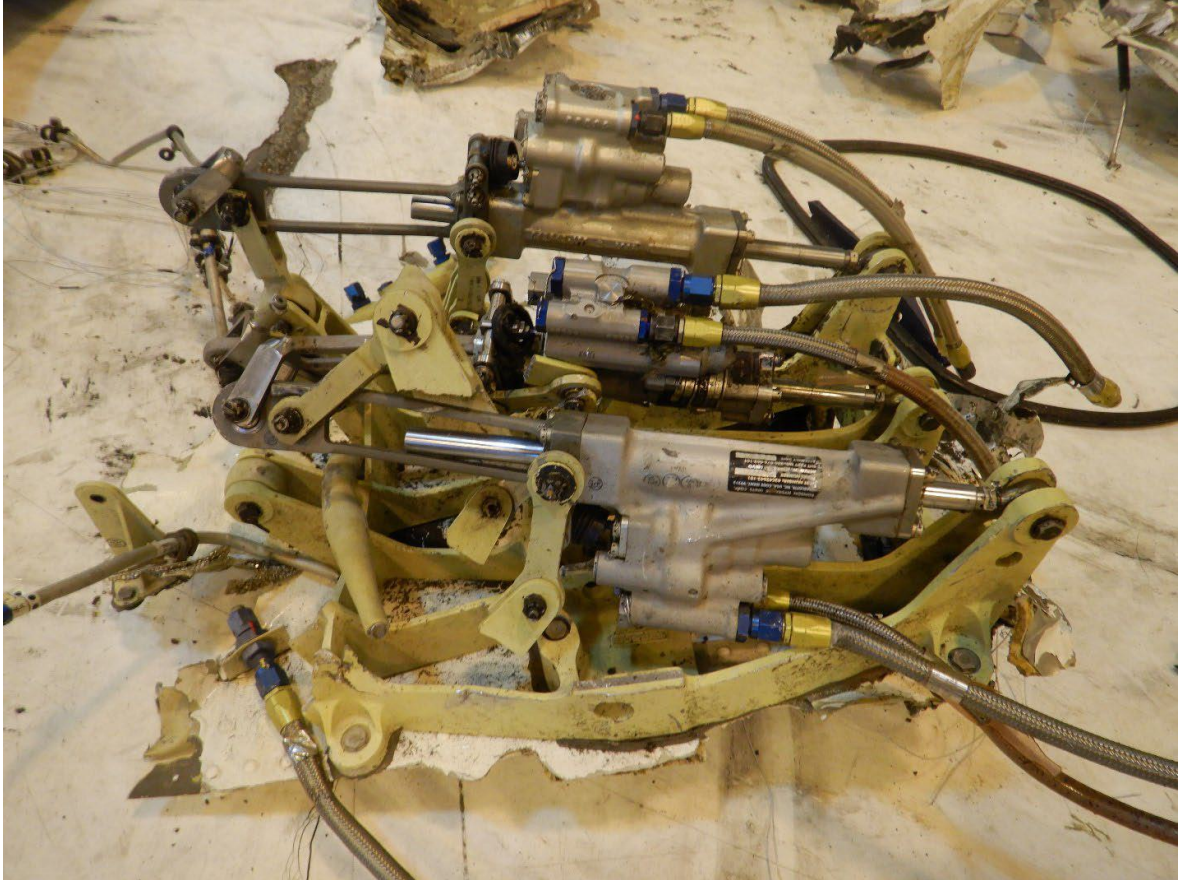


Figure 41 Flight control servos.



Figure 42 Side view of the flight control servos

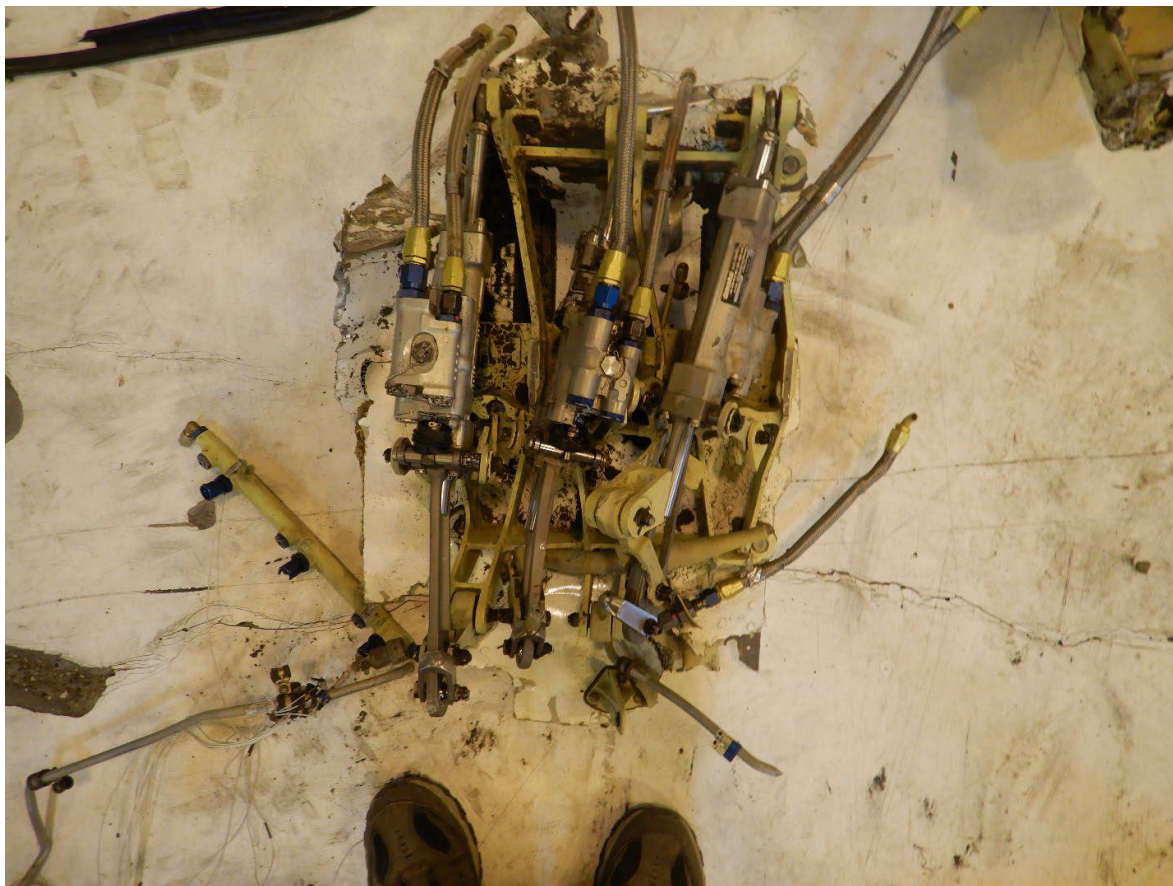


Figure 43 Top view of the flight control servos.



Figure 44 Flight control servo.

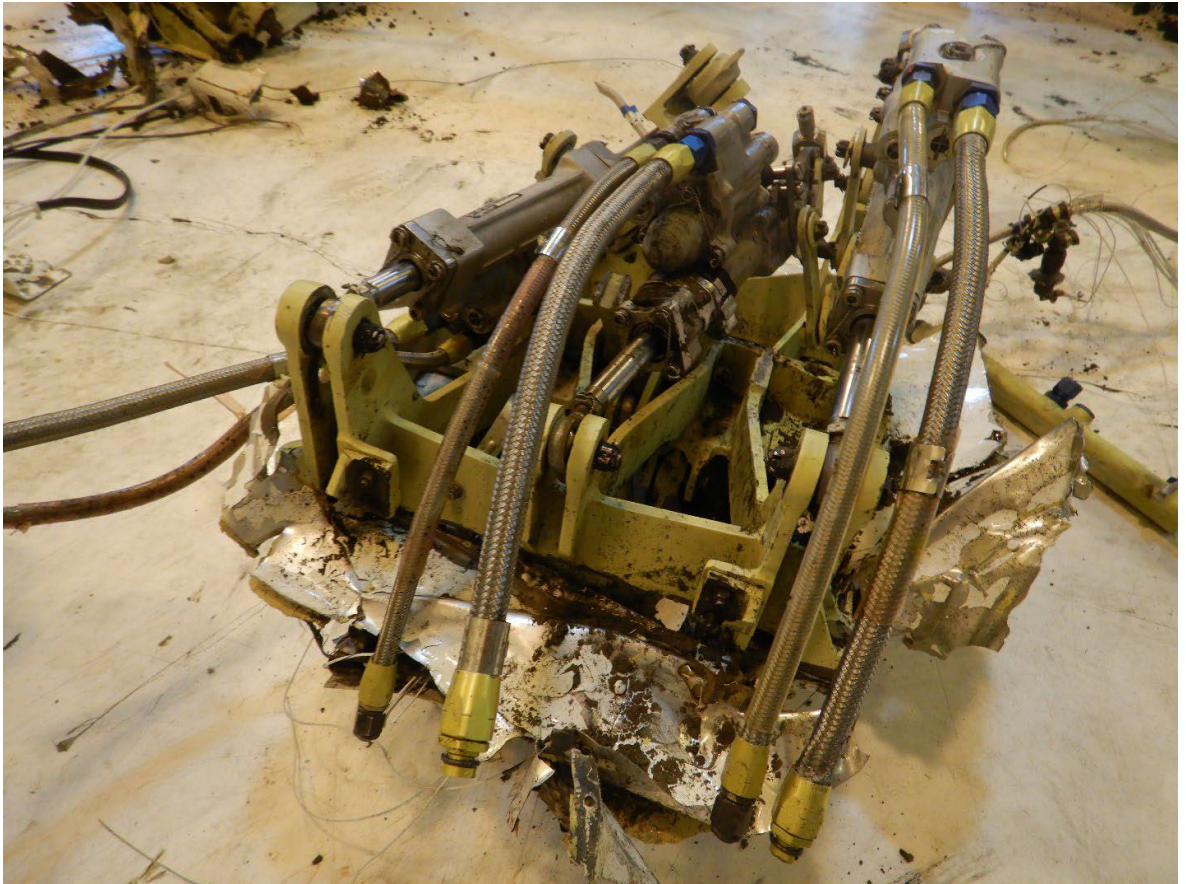


Figure 45 Flight controls servos.



Figure 46 Wire drive nuts on the flight control servos.

2.6 Survivability



Figure 47 Seatbelt attachment



Figure 48 Broken seat belt attachment.



Figure 49 Seatbelt attachment.

2.7 Fuel/Fuel System

The airframe fuel filter was broken free from its mount on the forward vertical firewall. The outlet supply hose from the filter housing to the inlet on the engine fuel pump/FCU had fractured. This allowed intrusion of lake water into the filter housing. The filter assembly was disassembled to assess the condition of any remaining fuel. Approximately 1 tablespoon of fuel was observed but was mixed with a visually evident amount of suspended water. The fuel filter was noticeably dirty but likely due to lake water exposure. The filter pleats were clear of any foreign debris. Clean, clear fuel was detected & drained at the inlet of the fuel spray nozzle. Fuel was also noted to discharge from the nozzle supply hose when turning the N1 drive system through at the tach generator pad. This is indicative of fuel present throughout the FCU & pump assembly.

The fuel spray nozzle was removed and examined. The air shroud on the nozzle tip contained a typical amount of light carbon layer that had been contaminated with rusty brown like debris indicative of lake water exposure. The nozzle appeared internally clear of debris & was not disassembled further.

2.8 Transmission

No pre-impact anomalies were observed in the main drive system and all fractures were consistent with overload forces. The main transmission remained mounted through all four intact pylon support links to the nodal beam supports. The roof structure was fractured surrounding the nodal beam supports from impact forces. Both chip detectors were removed for inspection and found to be clean with no debris. The main rotor blades were turned by hand and free movement with no unusual noises was observed at the KaFlex driveshaft, demonstrating main transmission drive continuity. The KaFlex main driveshaft remained connected at its forward end to the main transmission. Minimal rotational scoring was observed on the aft engine end exterior of the KaFlex shaft. The mast had contact marks from hard main rotor hub static stop contact and the mast was bent at this location. The freewheeling unit (FWU) exhibited a fractured outer race shaft assembly ("stub" shaft) that drives the FWU consistent with a sudden stoppage of main rotor while the engine was supplying power through its gearbox.

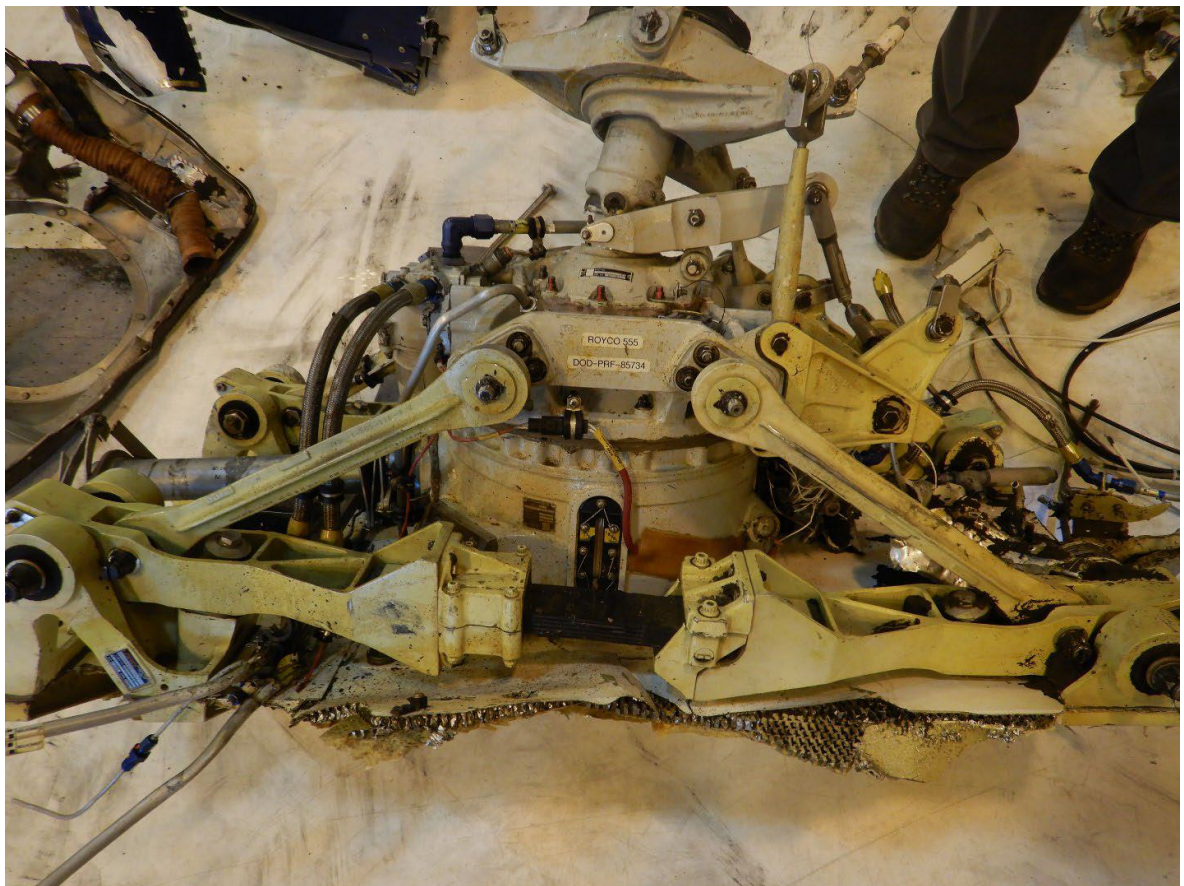


Figure 50 Right side view of the main transmission.



Figure 51 Right side view of the KaFlex.



Figure 52 KaFlex attachment from the main transmission to the engine.

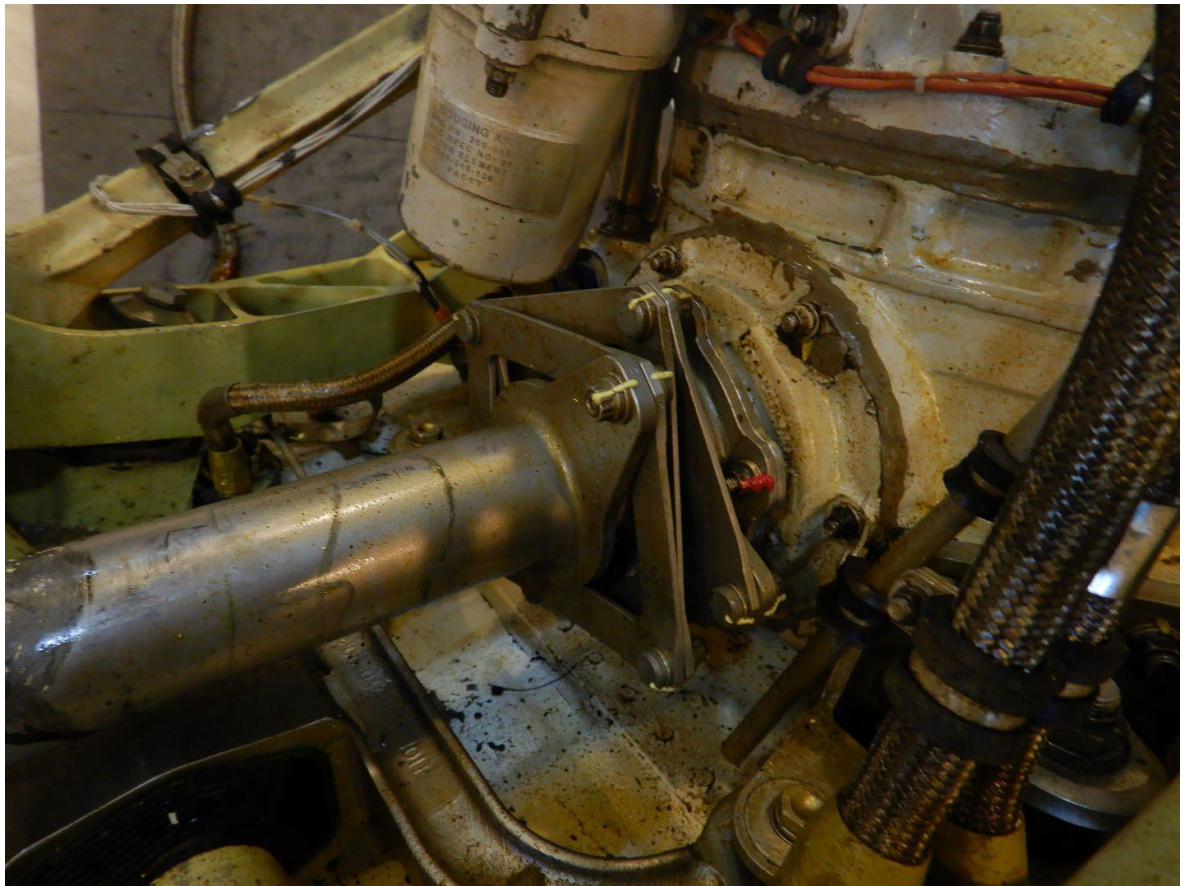


Figure 53 Right side view of KaFlex on main transmission.



Figure 54 Left view of the KaFlex on main transmission.

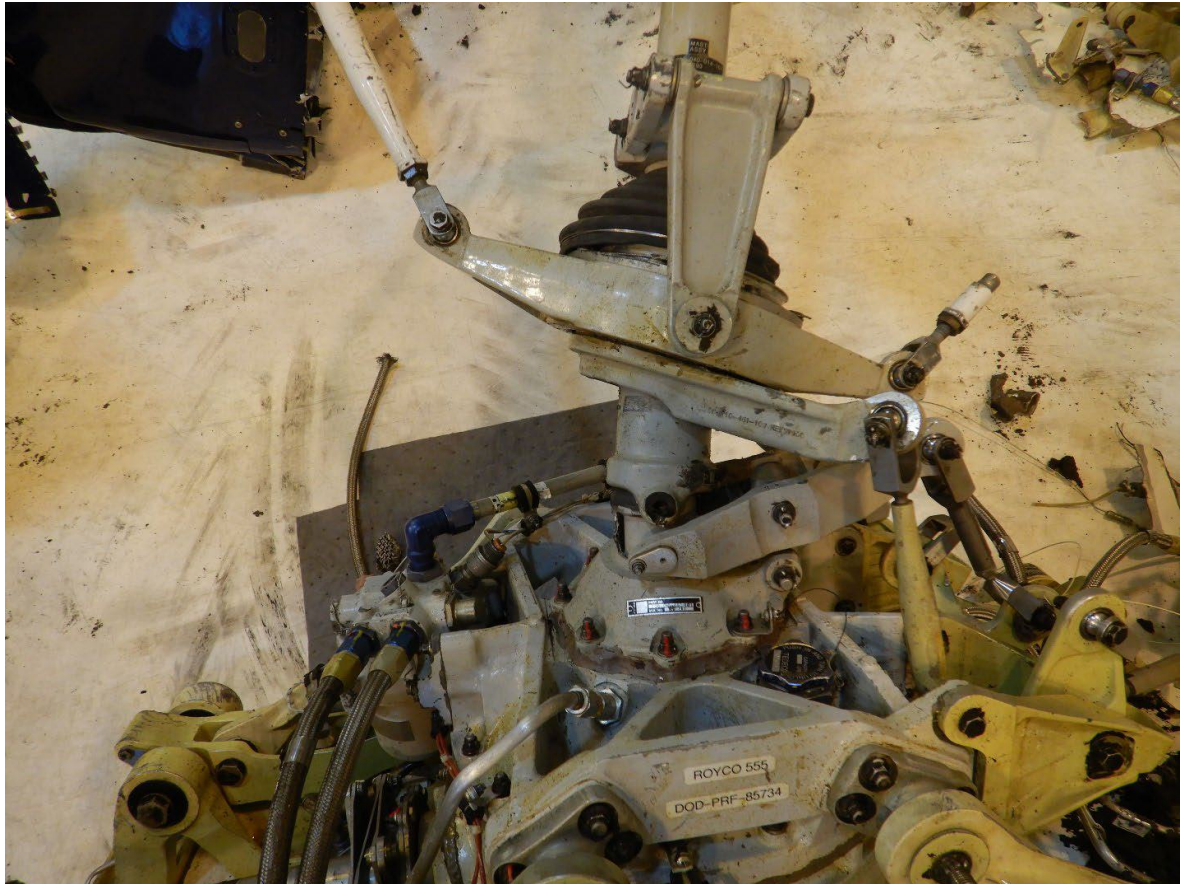


Figure 55 Right side view of the swashplate.



Figure 56 Left side view of main transmission.



Figure 57 View of attachment point of intact main rotor blade.



Figure 58 Main rotor hub on intact rotor blade.

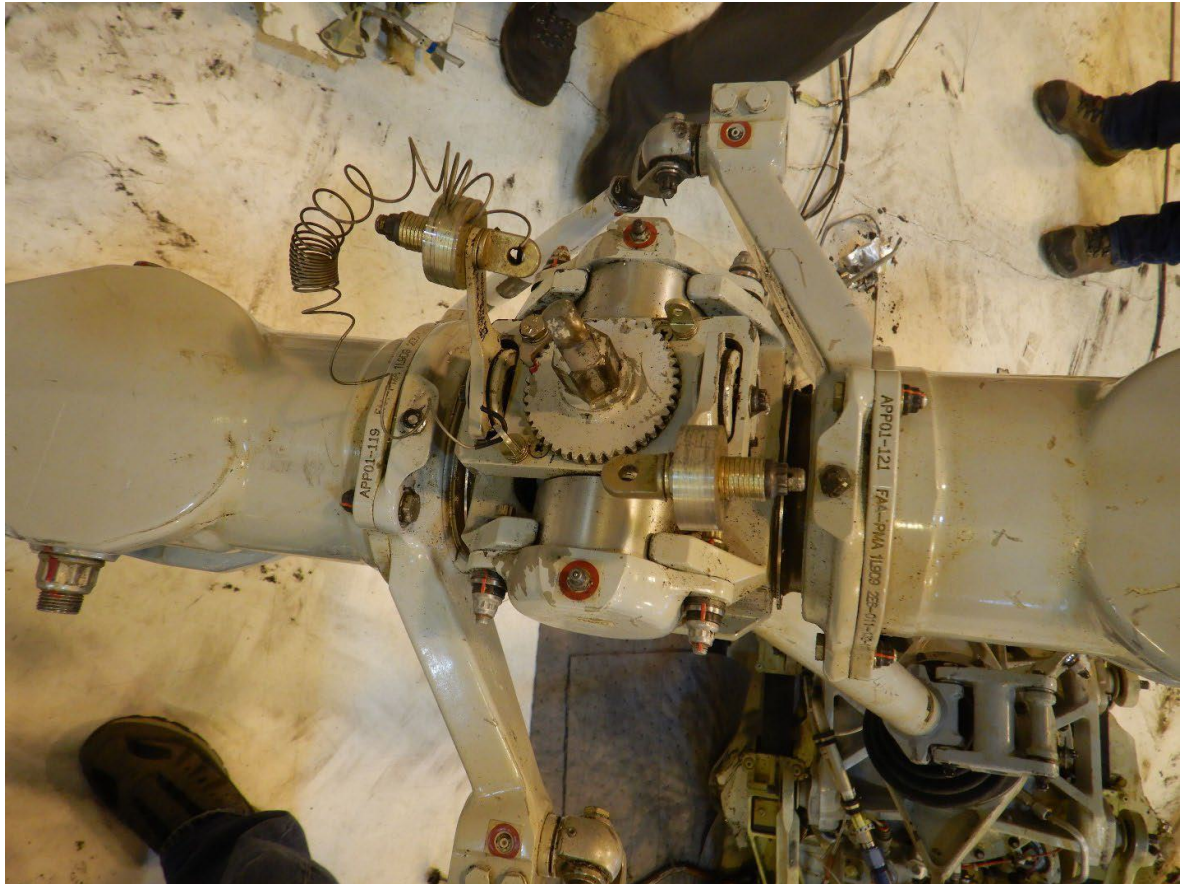


Figure 59 Main rotor hub view from above.



Figure 60 Main rotor hub attachment to non-intact rotor blade.

3.0 Engine Examination

There was no visible evidence of pre-impact fire, damage, or malfunction of the engine. Both N1 and N2 rotors were continuous, could be rotated by hand, & were smooth and quiet. The output shaft assembly, which is part of the freewheel installation, was fractured forward of its spline connection with the power takeoff gearshaft in the engine gearbox (Figure 62). The compressor impeller contained 2 blades approximately 180° apart that were heavily bent opposite the direction of rotation (Figure 61). Cockpit controls to the Power Turbine Governor (PTG) & Fuel Control Unit (FCU) were not recovered. The FCU pointer indicator was in the 100 (max) position. Both controls were checked to confirm full stop to stop travel of their input drive arms. Clean, clear fuel was detected & drained at the inlet of the fuel spray nozzle. Primary oil lines: supply, scavenge, vent, pressure, & torquemeter hoses were securely connected to the engine gearbox. Oil was present in the supply & scavenge hoses to the aft firewall immediately forward of the airframe oil tank & cooler compartment. Only the lower portion of the oil tank was recovered & the oil cooler assembly was distorted from impact forces. The engine oil filter & magnetic chip

detectors were clean of ferrous metal & related debris. Clean but somewhat darkened oil was observed in the engine pressure filter housing. All available evidence & observations suggests the engine was producing power & responding to throttle inputs.



Figure 61 View of compressor impeller.



Figure 62 The output shaft assembly.

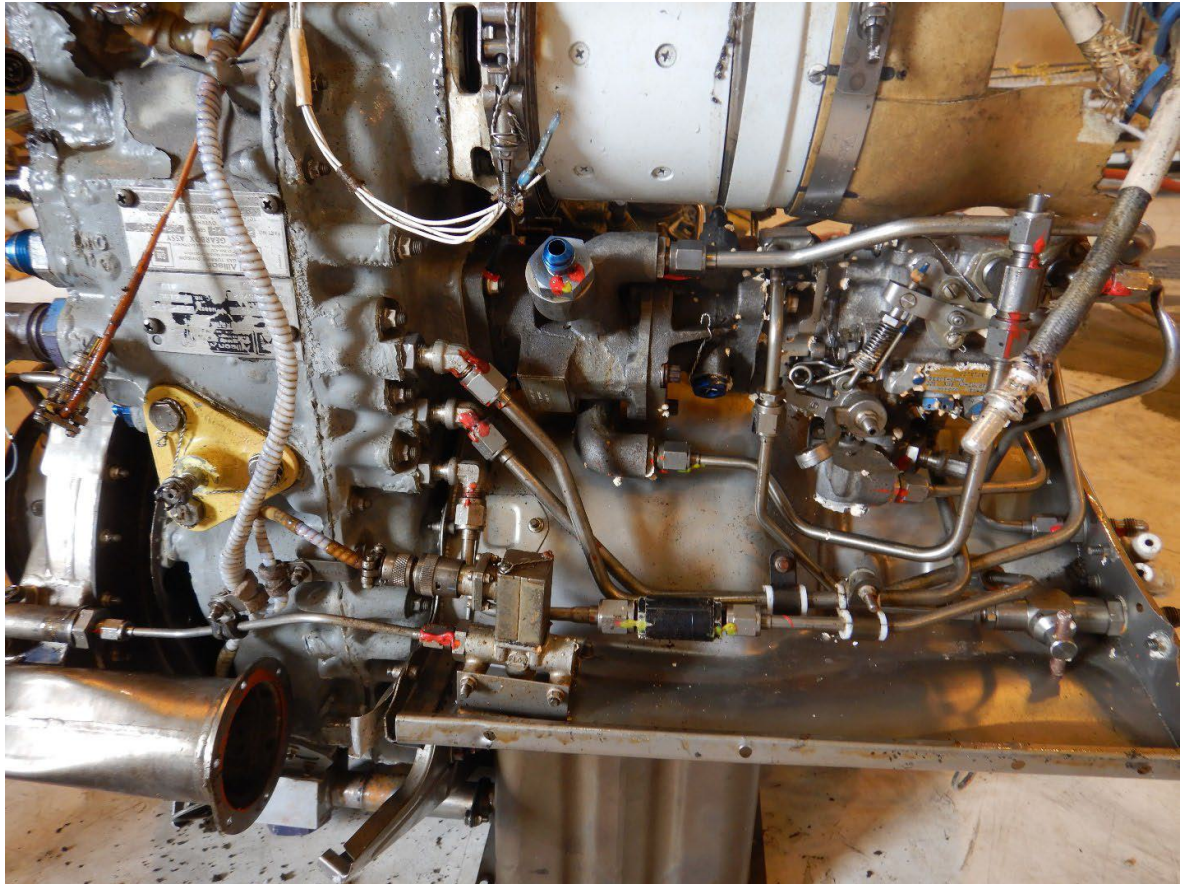


Figure 63 Side view of helicopter engine.

4.0 Pilot Information

On October 11, 2022, the pilot Bernard Anthony Higdon certificate number [REDACTED] reported the following.

Commercial rated pilot Rotorcraft-Helicopter and Instrument-Helicopter.

Total Flying hours	1907
Pilot-in-command	1201
Multi-engine turbine PIC	588
Simulated Instrument	72
Actual Instrument	18
Total time in Alaska	140
Total cold weather ops	277
Total cross country	945
Total night	693
Bell 206BIII	0
Bell 206LIII/L4	0
Bell TH-67A	82
Bell OH-58	531

UH-72A 588
Total flight time last 365 days - 0

Flight school - US Army Fort Rucker, AL completed September 2009
Medical certificate second class dated October 26,2022. Must have available glasses for near vision. Must use hearing amplification.
Initial training records,
Initial/Trans Bell 206L3 completed 1/5/23.
Initial/Trans Bell 407 completed 11/17/22.
Airman Competency/Proficiency Check in Bell 206 on 1/5/23. 1.6 hour flight.
Airman Competency/Proficiency Check in Bell 407 on 11/17/22. 1.2 hour flight

Month	Flight time	Days off
January	22.9	9
February	18.4	7
March	20	14
April	21.4	13
May	9	15
June	33.3	11

Pilot flew from Fairbanks on July 16 toward Barrow but was turned around because of poor weather. July 17 pilot flew from Fairbanks to Barrow. July 18 pilot did not fly. July 19 the pilot flew missions. July 20 the pilot departed Barrow with 3 passengers, stopped at Atkasuk for about 10 minutes then proceeded towards RPD010.

5.0 Meteorological Information -

Accident 0304Z
Atkasuk - METAR PATQ 210305Z AUTO 22005KT 3 1/2SM HZ CLR 26/14 A2981
Wainwright - METAR PAWI 210340Z AUTO 36011KT 9SM FEW047 BKN060 OVC090 13/11 A2980
METAR PAWI 210253Z AUTO 36010KT 10SM FEW043 BKN055 OVC070 13/11 A2981 RMK AO2 SLP093 T01330106 56013 TSNO

Submitted by:

M.Ward
ASI