

INVESTIGATION SUPPLEMENTAL DOCUMENTATION

HISTORY OF FLIGHT

On January 23, 2019, at 1143 Pacific standard time, a Bell 206L-3, N8227J, collided with trees while maneuvering near the Siskiyou Summit south of Ashland, Oregon. The airline transport pilot, the sole pilot, was fatally injured; the helicopter sustained substantial damage. The helicopter was registered to HeliFleet LLC and operated by Erickson Helicopters Inc., under the provision of 14 Code of Federal Regulations Part 91. Marginal visual meteorological conditions prevailed in the area of the accident and a company visual flight rules flight plan had been opened. The local area time-building flight originated from the Medford Airport, Medford, Oregon, at 0920.

The pilot had arrived in Medford the evening of January 21 with the purpose of amassing flight-time during his visit to fulfill Erickson's annual flight-time insurance requirements. On the day prior, he had flown the accident helicopter on two different flights totaling five hours of flight time.

WRECKAGE AND IMPACT

The accident site was located in the dense tress about 9 nautical miles (nm) southeast of Ashland. In character, the terrain was composed of mature Douglas-Fir and Ponderosa Pines trees between 100-150 feet in height. The wreckage was found distributed over a 100 ft distance with no discernable flight path direction.

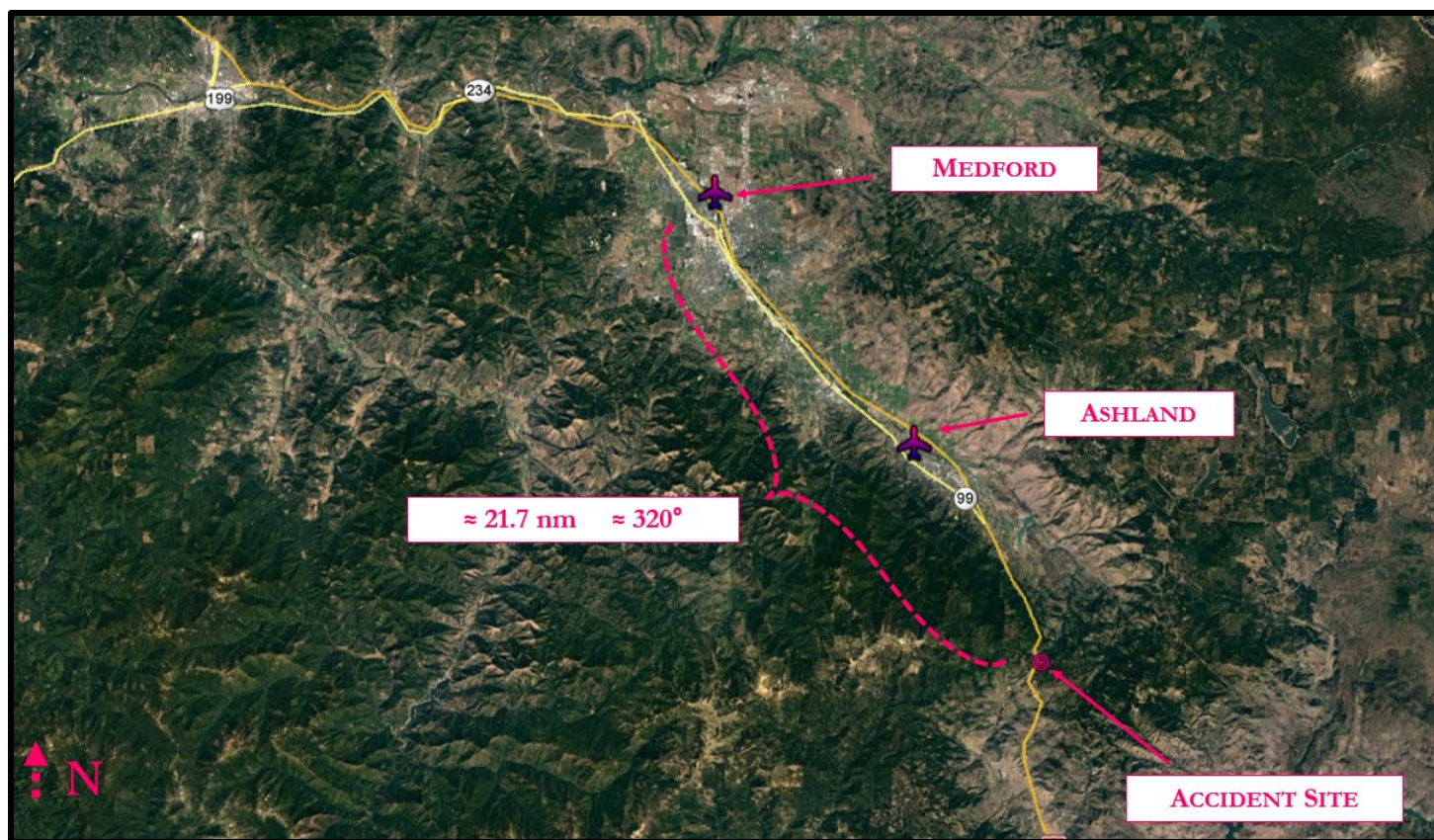


Figure 1: Accident Site in Reference to Departure Airport

A review of the preliminary radar data disclosed that in the 1.5 hours following departure, the helicopter maneuvered in the local area west of Ashland making numerous turns. Thereafter the helicopter continued south over the Siskiyou Summit and after making various low-level maneuvers, followed Interstate 5 (I-5) toward Hilt, Oregon. Around 1120 the helicopter began to head north and made several turns and slow maneuvers. At 1141, the helicopter continued north and adjoined the I-5 for about 1.5 minutes. At 1142:50 the radar track showed that the helicopter then made several turns until heading east. The last radar return at 1143:30 was located in the immediate vicinity of the accident site and oriented about 600 ft east of the interstate at an elevation of about 4,100 ft.

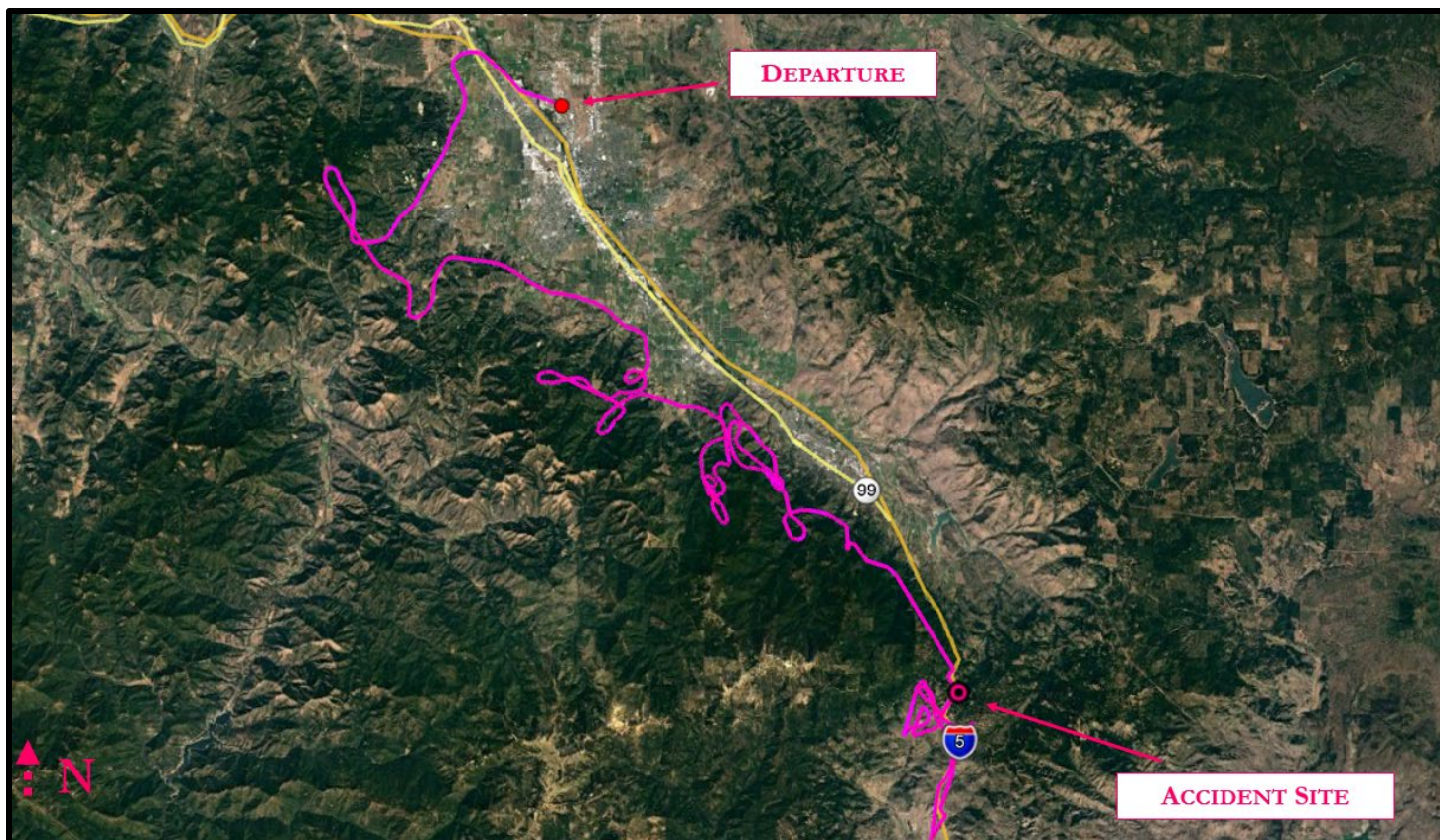


Figure 2: Radar Data

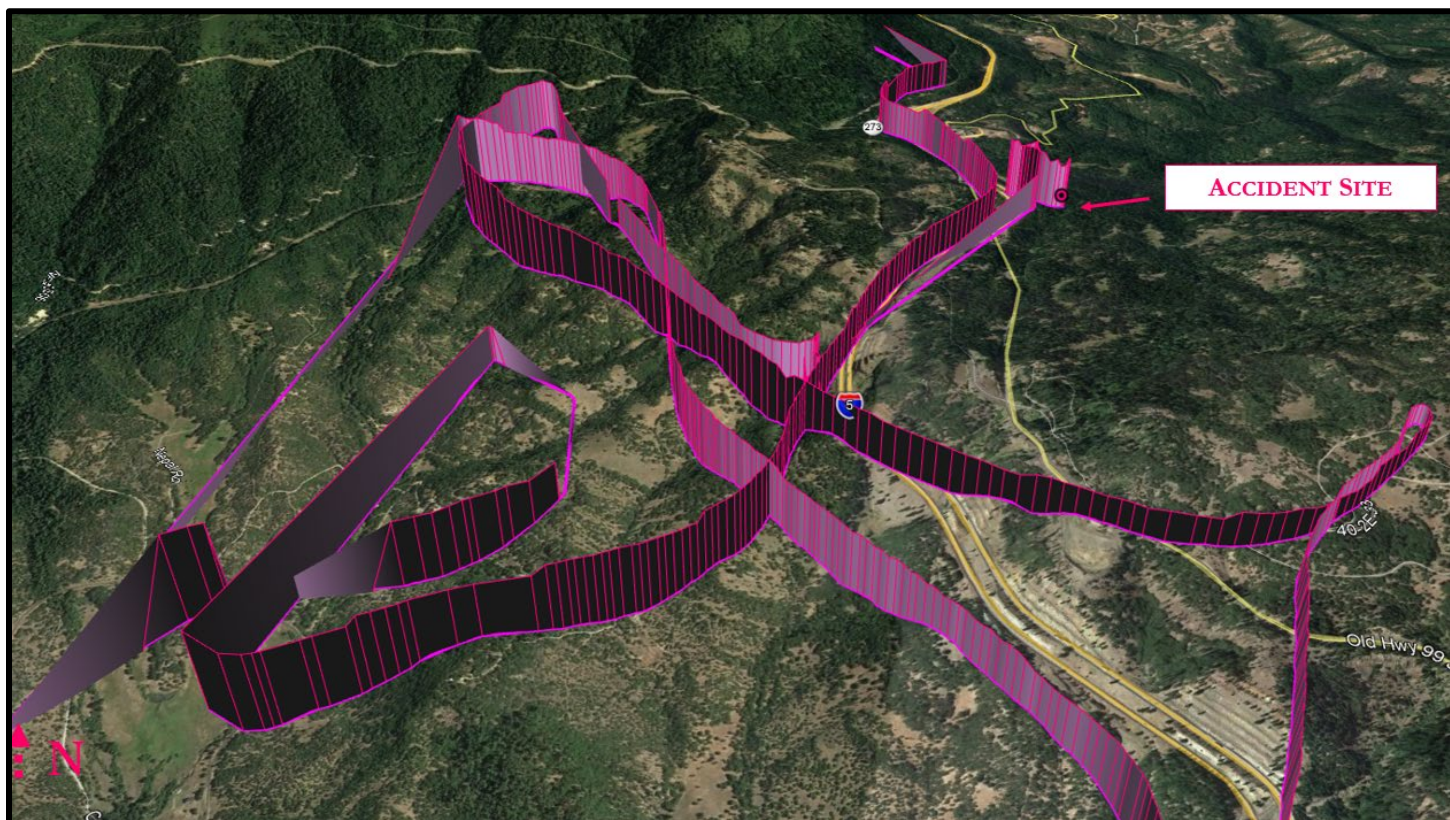
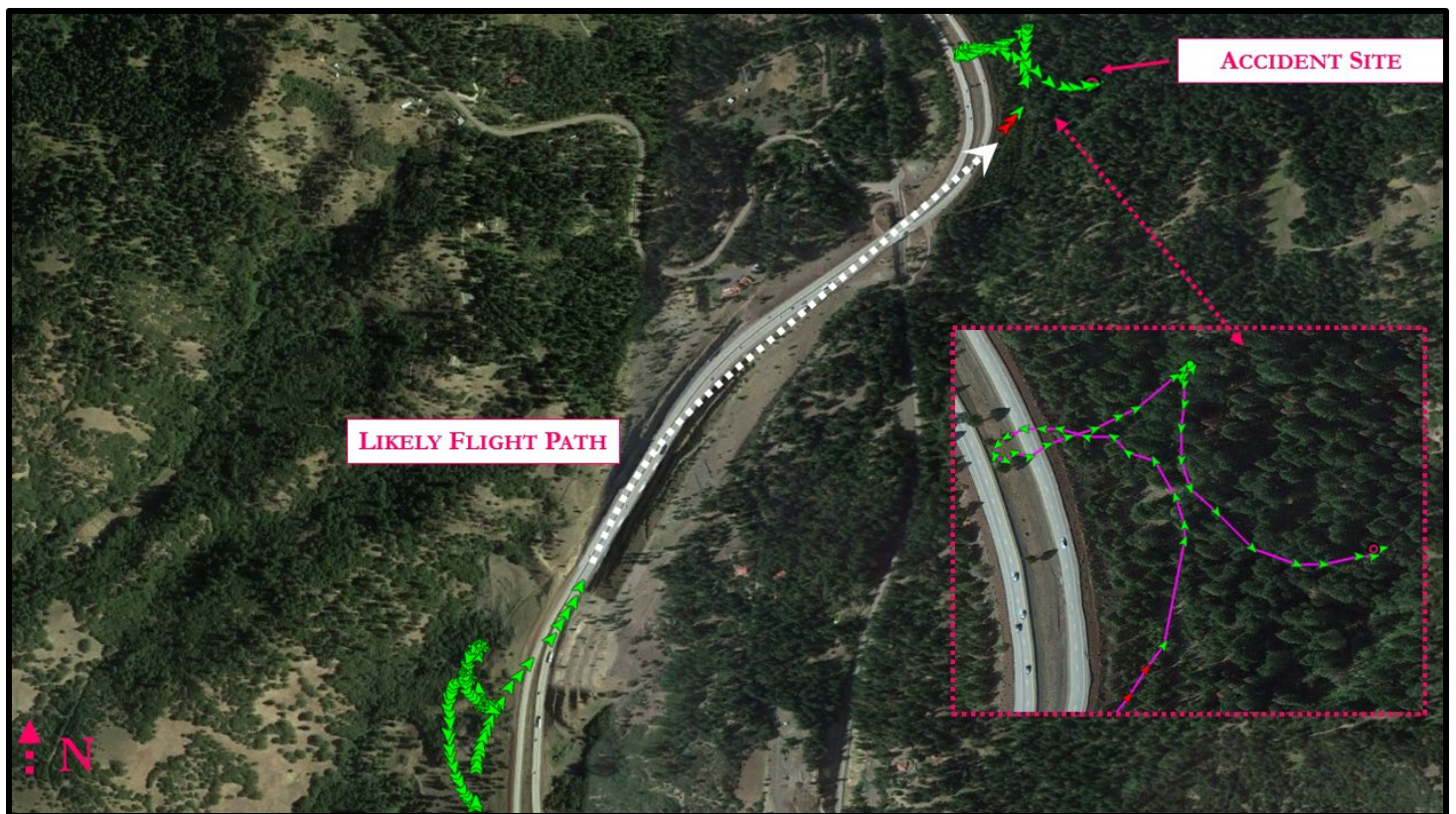


Figure 3: Maneuvers Prior to Accident



TEST AND RESEARCH

HELICOPTER INFORMATION

The Bell 206L-3 Long Ranger, serial number 51313, was a single engine, land-based helicopter configured for two pilots and five passenger seats. The helicopter was sold by Evergreen Helicopters, Inc., in March 2009 and purchased by GC Air, LLC followed by HeliFleet LLC. The helicopter was manufactured in 1989 and Hobbs meter showed that it had amassed 5,090.6 hours of total flight time. The helicopter was equipped with a 650-shaft horse power Rolls Royce M250 C30P turbo-shaft engine.

At the time of departure the helicopter had 5088.3 hours total time and 5944 starts on the engine.

AIRFRAME

The examination of the helicopter's control system that control tubes were cut to facilitate recovery.

The flight controls are mechanical linkages that are actuated by conventional controls and used to control flight attitude and direction. Both the cyclic (longitudinal and lateral) and the collective controls incorporate hydraulic servo actuators. A synchronized elevator is linked into the fore and aft controls at the cyclic torque tube. The flight controls are routed beneath the forward seats, aft to the vertical control column (broom closet), then up to the cabin roof. The vertical control column also serves as a primary cabin structure.

CYCLIC

There were dual cyclic flight controls installed which consisted of a pilot and co-pilot control stick, torque tube, yoke, hydraulic servo actuators, control tubes, and bellcranks. As designed, movement of either control stick is transmitted through linkage and hydraulic servo actuators to the swashplate, which actuates the rotating controls to the main rotor. The cyclic sticks extend upward and forward from the front of the pilot and co-pilot's seat, respectively. A torque tube assembly interconnects the control sticks by attaching to their respective levers (center aft bearing). The pilot stick's lever are mounted on a round bearing and the copilot's stick has a quick disconnect connection to the control system and is mounted on a support assembly. For the copilot's cyclic, movement of the stick results in the lever's lower bearing moving along a bolt in the support structure. Another torque tube connects to the cyclic stick support and provides a mounting point for the elevator controls. The cyclic system yoke extends aft from the cyclic stick levers (connected to the upper bearing). Movement of the cyclic stick is transmitted to the mixing lever by means of the yoke. This mixing lever transmits cyclic movement to the swashplate through mechanical linkage and servo actuators. A balance spring is used in the system to minimize the cyclic stick mass imbalance forces and elevator induced forces in the longitudinal control system.

Examination of the cyclic revealed that the control sticks were intact and connected to their respective yoke attach points at the upper bearing in their levers. The lower bearing on the co-pilot's lever was displaced; there were corresponding shiny marks on the outboard structure support and the outboard lever. Removal of the lever revealed that the bearing was displaced in the housing and had sustained a gouge on the outer race. A sliver of circular metal was found under the bearing, consistent with it being a shaving from the bearing.

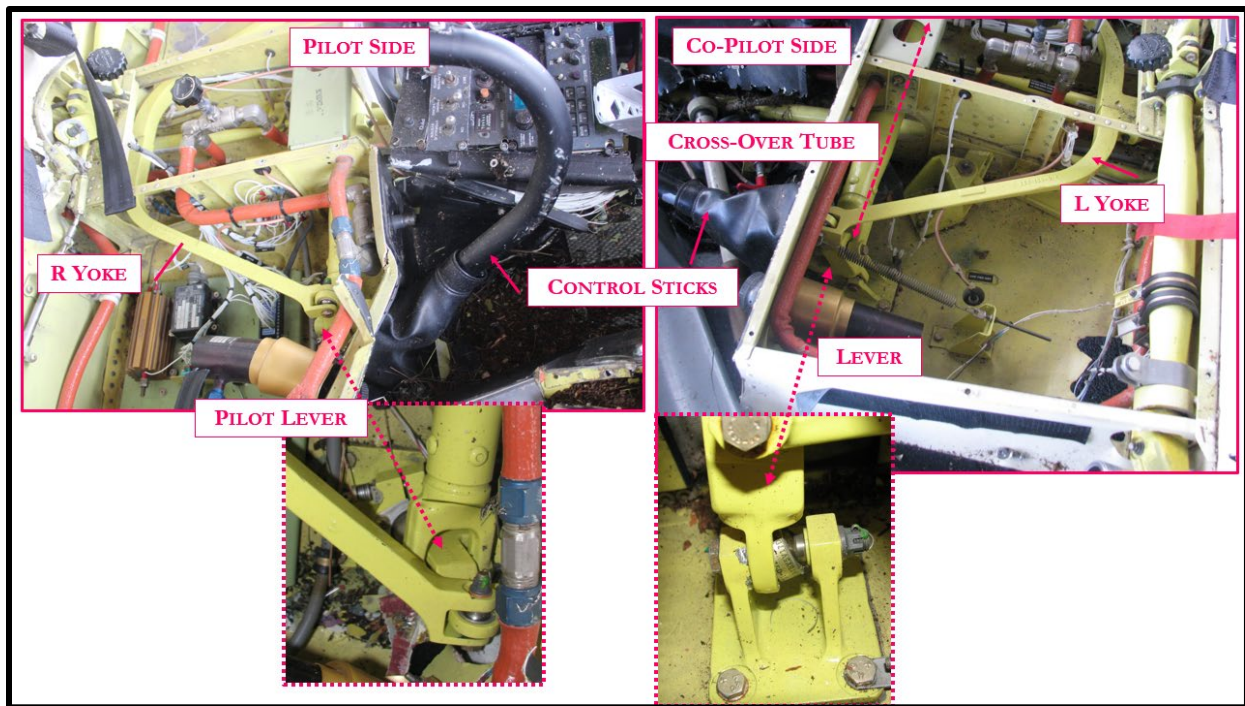


Figure 6: Cyclic Controls

The bearing listed the following information:
 206-301-051-101 (j/n01095 HT AD20)
 Astro ATBY5V17DHS 5-13-83 AD8

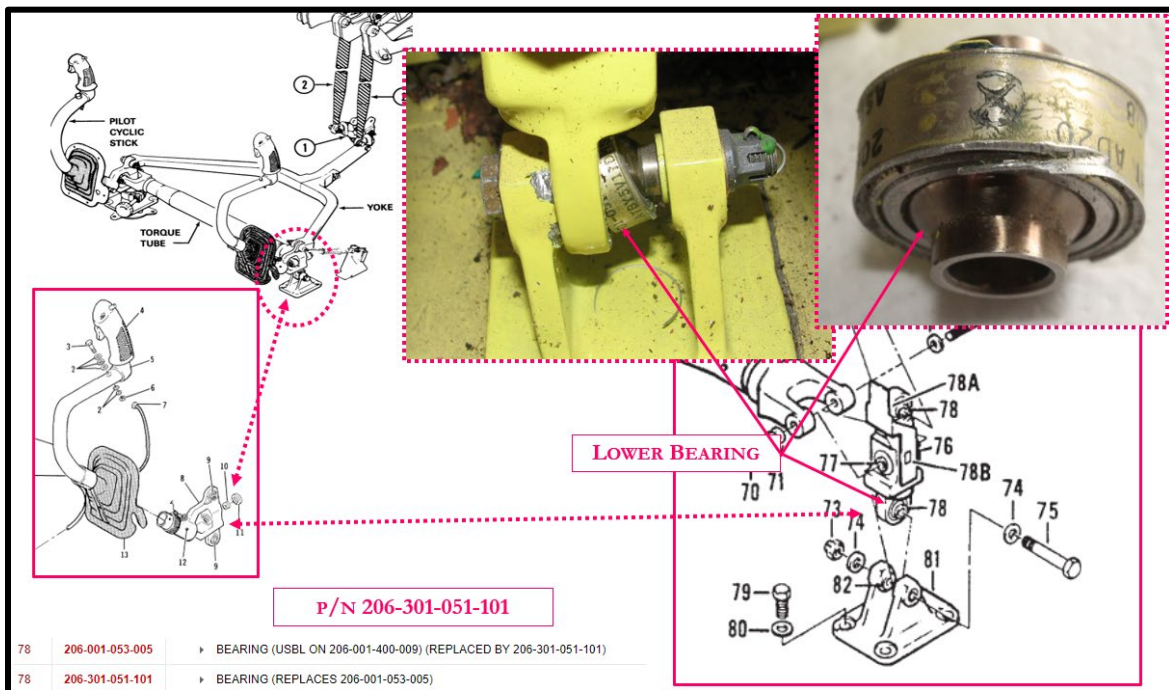


Figure 7: Co-Pilot Cyclic Control

The lever was stamped with the following information:
 206-001-339-1

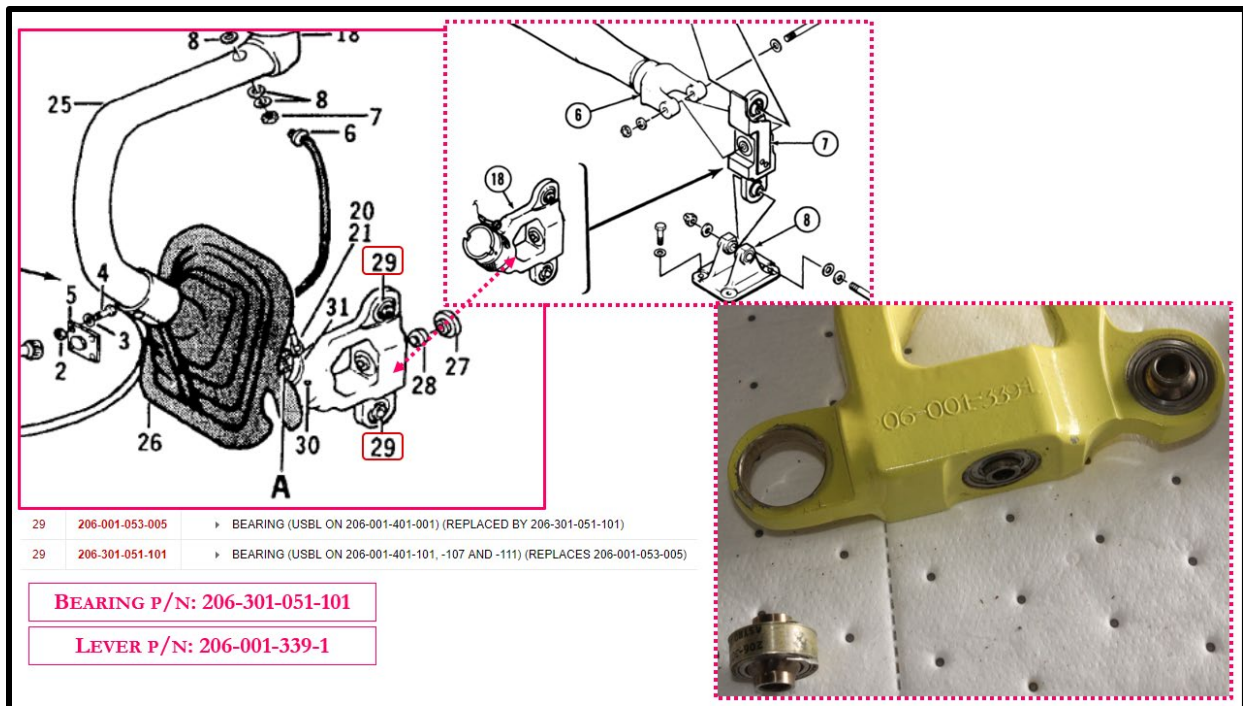


Figure 8: Co-Pilot Cyclic Lever

The yoke remained attached to the mixer and the right and left cyclic control tubes. The two vertical cyclic pushrods within the broom closet remained attached at the mixer and were severed for recovery purposes. From the upper cuts, the control tubes were continuous to the servos, which remained attached to their respective support brackets. The right control tube was detached at the bellcrank for recovery; the left control tube was broken from the servo to the bellcrank. The rod end remained attached to the bellcrank and the fracture surface was consistent with overload. Both FAA inspectors and Erickson personnel reported that all the remainder of the control tubes were connected at the accident site and disconnected for recovery purposes, which included the pitch change links being connected at the rotating swash plate and rotor blade pitch horns.

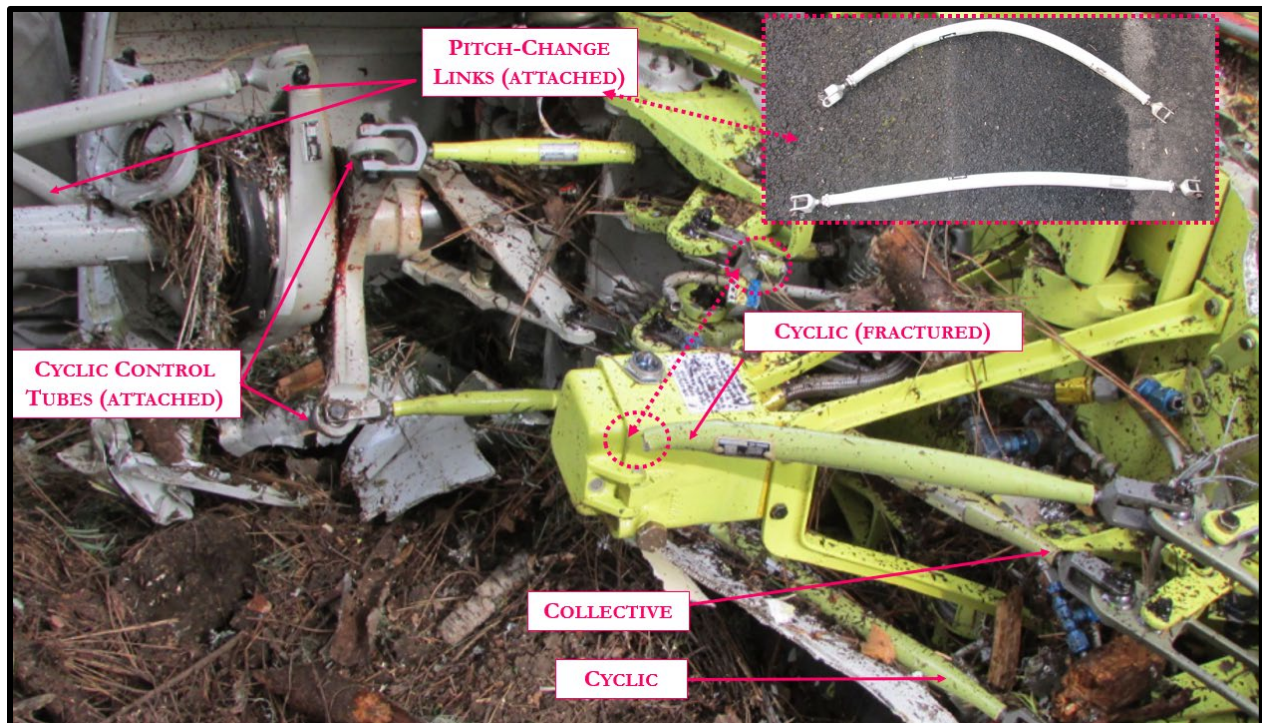


Figure 9: Control Tubes from servos to Mast as seen at Accident Site

BELL LITERATURE REGARDING BEARING AND LEVER

A review was conducted of the Bell 206L-3 maintenance manual (MM), illustrated parts catalogue (IPC), alert service bulletins, component repair and overhaul manual, and service installation instructions. There was no reference to lever p/n 206-001-339-1 (the number located on the lever found in the accident helicopter); rather the part numbers listed for that lever were: 206-001-401-001, replaced by 206-001-401-101, replaced by 206-001-401-107, replaced by 206-001-401-111.

The upper and lower bearing was shown as 206-001-053-005 (USBL ON 206-001-401-001), replaced by 206-301-051-101 (USBL ON 206-001-401-101, -107 AND -111). Bell indicated that the 206-001-339-1 part is a forging part number that is part of the copilot 206-001-401- cyclic lever assemblies.

The bearing's wear limits were listed in the standard practice manual.

BEARING PART NUMBER	BEARING WEAR LIMITS MAXIMUM PLAY			
	RADIAL		AXIAL	
	INCH	(MM)	INCH	(MM)
206-063-719	0.005	(0.13)	0.030	(0.76)
206-064-103-001	0.000	(0.00)	0.006	(0.156)
206-301-051-101	0.005	(0.13)	0.010	(0.25)

ALERT SERVICE BULLETIN

Alert Service Bulletin 206L-09-156, dated April 09, 2009, covered 206L-3 models between serial number 51001 through 51612 (accident serial was 51313). This mandated a one-time inspection of the bearing to ensure it was properly staked. The alert stated that:

Bell Helicopter received two reports where a bearing had migrated out of a flight control lever. Investigation revealed that, although the inspection witness mark was applied to the part, the bearing had not been staked during manufacturing. Affected parts were associated with a single Bell Helicopter supplier. Review of the supplier's manufacturing and quality process indicates inspection of additional components is necessary.

AIRWORTHINESS DIRECTIVE (AD)

In August 2013 the FAA issued Airworthiness Directive AD 2013-18-16 that mandated a one-time inspection of the bearing within 10 hours of time-in-service or 30 days, whichever was to occur first. Erickson provided a copy of a logbook entry that indicated the AD was complied with on November 30, 2014 at which time no defects were noted.

ITEM # 308	DATE 11/30/14	STARTED BY: JC	S/N OFF	TSO	S/N ON	TSO	DATE 12/28/14
[9900-2013-18-06] AD2013-18-06 {effective Date: 17 Oct 2013} Bearing Migration out of proper position inspection Due.			TSN				
DISCOVERED BY: [REDACTED]			CORRECTED BY: [REDACTED] RII:				

Handwritten note in logbook entry: CIW AD 2013-18-06 (Amendment 39-17579) using a 10X MAGNIFYING GLASS INSPECTED EACH BEARING AND DETERMINE IF BEARINGS WERE STAKED, NO DEFECTS NOTED AT THIS TIME

Figure 10: Logbook Entry for AD-2013-18-16

Airworthiness Directive August 1969

The Federal Register from 1970 referenced an Airworthiness Directive 206A-14. In pertinent part it stated:

There has been one report of unstaked control bearings in the Lever Assembly, P/N 206-001-339-1, on Bell Model 206A helicopters equipped with copilot controls. The displacement of the bearings from their normal position could occur and result in partial restriction of the cyclic control system. Such restriction of the cyclic control system in flight could result in loss of control of the helicopter. Since this condition is likely to exist in other helicopters of the same type design that are equipped with copilot controls...

The accident lever's part number, 206-001-339-1, was listed in Bell publications as being used on the following models:

206A: 206-001-339-001 UOC (usable on code); serial 4-153 [bearing used 206-001-053-001 or -005]

206B: 206-001-339-1 (replaced by 206-001-339-015); serial 4-153 [bearing used 206-001-053-001 or -005]

206B-3: 206-001-339-1 (replaced by 206-001-339-015); no serial given [bearing used 206-001-053-001 or -005]

COLLECTIVE

The twist grip throttle on the collective controls the gas producer fuel control and consists of a flexible control cable which extends from the throttle arm on the rear of the collective stick to a bellcrank assembly mounted on the engine deck. A control tube is connected between the bellcrank and a lever mounted on the fuel control shaft.

The pilot's collective was severed at the base. The collective's control tube and flexible cable were severed in the area of the upper broom closet for recovery. Continuity of the throttle could not be established due to numerous fractures in the control tube linkages and the FCU arm was broken free; all fracture surfaces were consistent with overstress and indicative of having been connected at the time of impact. were predominately intact from the collective stick to the point of attachment at the hydraulic actuator on top of the fuselage.

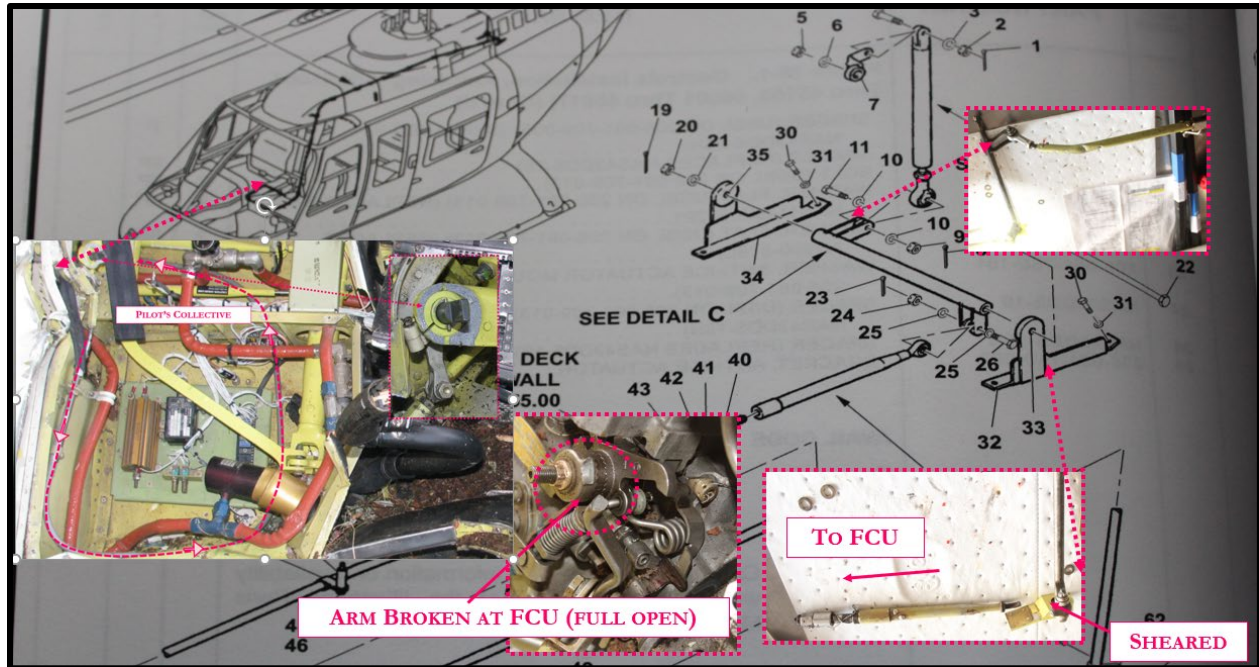


Figure 11: Collective Throttle Control

TAIL ROTOR (ANTI-TORQUE) SYSTEM

The pilot's anti-torque pedals were intact to the bellcrank. The outboard foot plate/doubler was pushed upward consistent with the severity of the impact from the forward right of the helicopter. An approximate 4 in portion of the control tube had separated and was found within the wreckage.

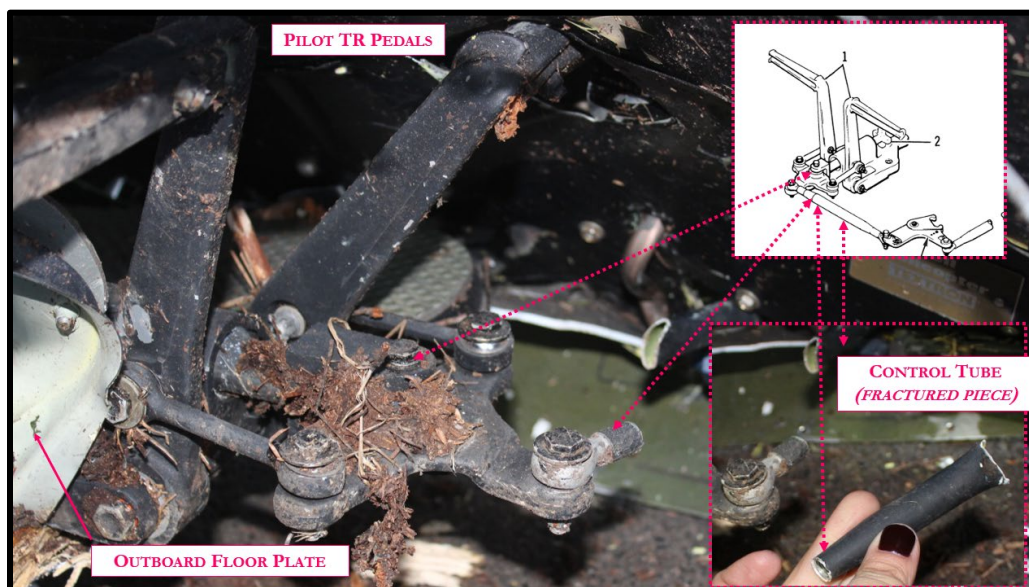


Figure 12: Pilot's Tail Rotor Controls

The control tube from the co-pilot's bellcrank to the joint bellcrank was fractured at the rod end. When aligning the bends and fractures in the control tubes with the surrounding fuselage structure, the pedals were consistent with being a full right pedal input at the time of impact. The pushrod from the bellcrank continuing aft to the broom closet could not be completely examined due to crush damage of the fuselage preventing visual exposure. The tail rotor anti-torque and elevator controls exhibited control tube and support fractures in areas of airframe damage and fracture.

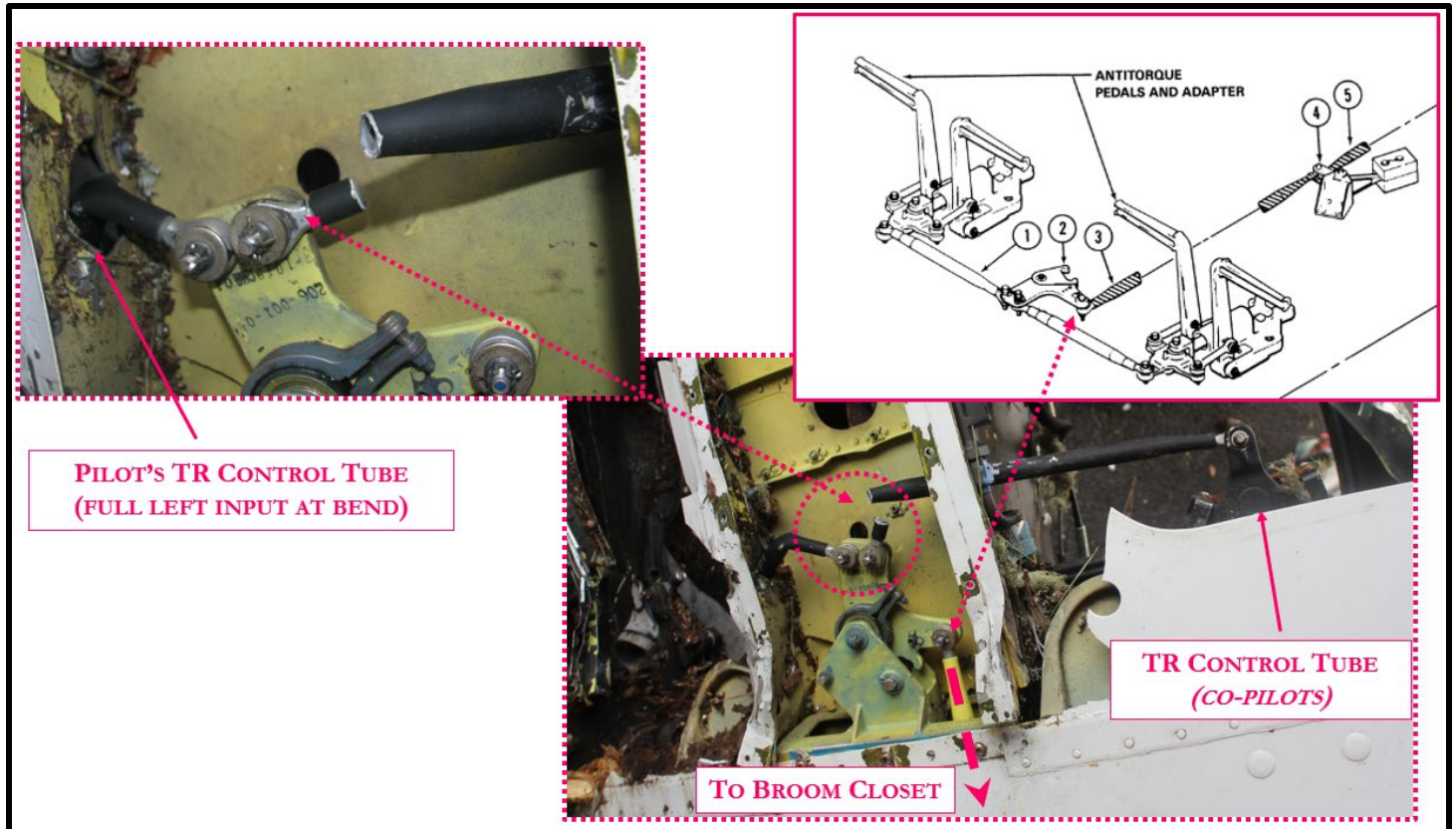


Figure 13: Tail Rotor Control Tubes

The skids were splayed flat at the front crossbar. The left skid had a bend between the supports

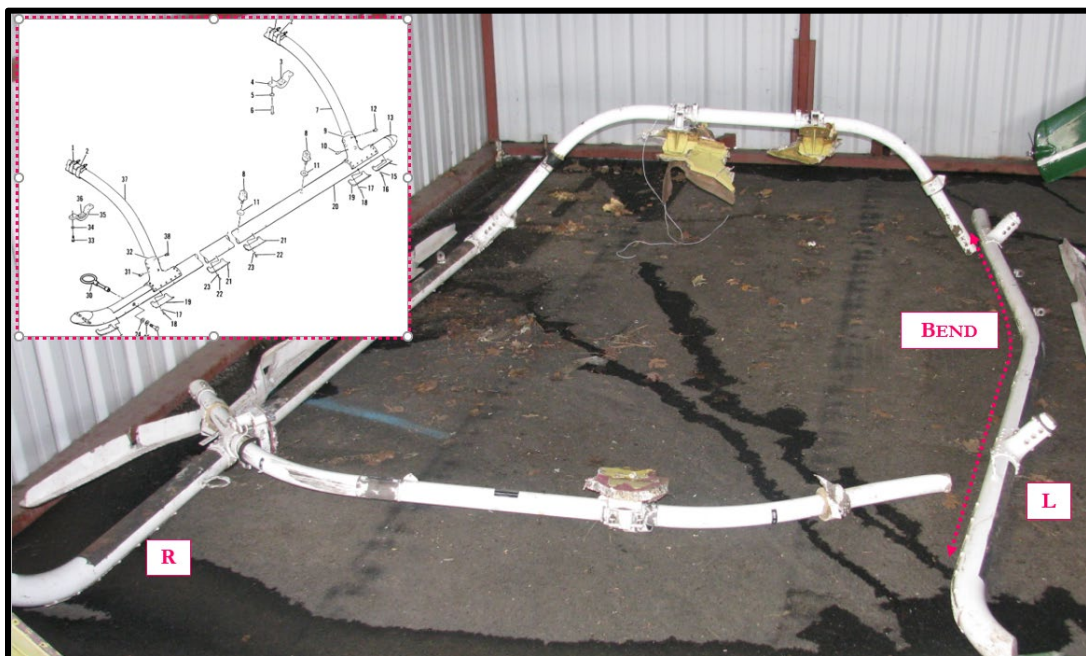


Figure 14: Landing Skids

			206L	206L-1	206L-3
Dimensions	Fuselage	Length	10.13m	10.13m	10.13m
		Width	1.32m	1.32m	1.32m
		Height	3.11m	3.11m	3.11m
	Main Rotor	Diameter	11.28m	11.28m	11.28m
	Tail Rotor		1.65m	1.65m	1.65m
Number of Main Rotor Blades			2	2	2
Engines			Rolls-Royce Allison 250-C20B/J	Rolls-Royce Allison 250-C28B	Rolls-Royce Allison 250-C30P
Engine Control System			Hydro-mechanical	Hydro-mechanical	Hydro-mechanical
Fuel Cells	Number of Cells		3	3	3
	Usable Capacity		98 U.S. gallons	98.4 U.S. gallons	110.7 U.S. gallons
Air Speed	Power ON ⁽¹⁾	Absolute V _{NE}	130 kt	130 kt	130 kt
	Power OFF ⁽²⁾		100 kt	100 kt	100 kt
	Doors Off ⁽²⁾		87 kt	90 kt	90 kt
Rotor Speed	Power ON		97 – 100%	97 – 100%	97 – 100%
	Power OFF		97 – 100%	90 – 107%	90 – 107%
Max Operating Pressure Altitude			20,000 ft	20,000 ft	20,000 ft
MTOW with Internal Load			4000 lbs (1814 kg)	4050 lbs (1837 kg)	4150 lbs (1882 kg)
MTOW with External Load			4000 lbs (1814 kg)	4250 lbs (1928 kg)	4250 lbs (1928 kg)

Figure 15: Helicopter Information

FUEL SYSTEM

The LongRanger was powered by a turboshaft engine that operated on aviation turbine fuel. Fuel was stored in three interconnected bladder-type fuel tanks with a maximum capacity of 424 L, including 5 L of unusable fuel (see the fuel system diagram in appendix A). Two tanks were relatively small and were located under the forward seats in the passenger cabin. The larger main fuel tank was located under and behind the rearmost seats. Fuel for the engine was supplied from the main tank only.

The two forward tanks were directly interconnected with no restriction to fuel flowing laterally between them. To be usable, fuel in the forward tanks needed to be transferred to the main tank. This transfer process used the surplus fuel flow from the two electric boost pumps and piped that fuel through a filter and flow switch to a dual-element ejector pump connected to the forward tanks. The flow of fuel through the ejector pump created suction to transfer fuel from the forward tanks to the main tank.

When the engine was operating, the inter-tank transfer process was automatic and continuous. If one of the boost pumps failed or a supply line to the ejector pump blocked, the other pump could provide sufficient fuel flow to maintain the inter-tank transfer. Any loss of flow to the ejector pump would be detected by the left or right flow switch and activate the applicable annunciator on the instrument panel. If both boost pumps failed, or both supply lines to the ejector pump blocked, as much as 87 L might remain in the forward tanks and be unusable.

Over time the helicopter manufacturer had reduced the risk of transfer line blockage by introducing a new flow switch and moving the in-line filter to upstream of the flow switch. Both modifications were incorporated into the helicopter.

After being picked up at the bottom of the main tank and passing through the two boost pumps, fuel was piped to the top of the tank. From there fuel was piped to the engine through a fuel pressure sensor, electrically-operated shut-off valve and low pressure fuel filter.

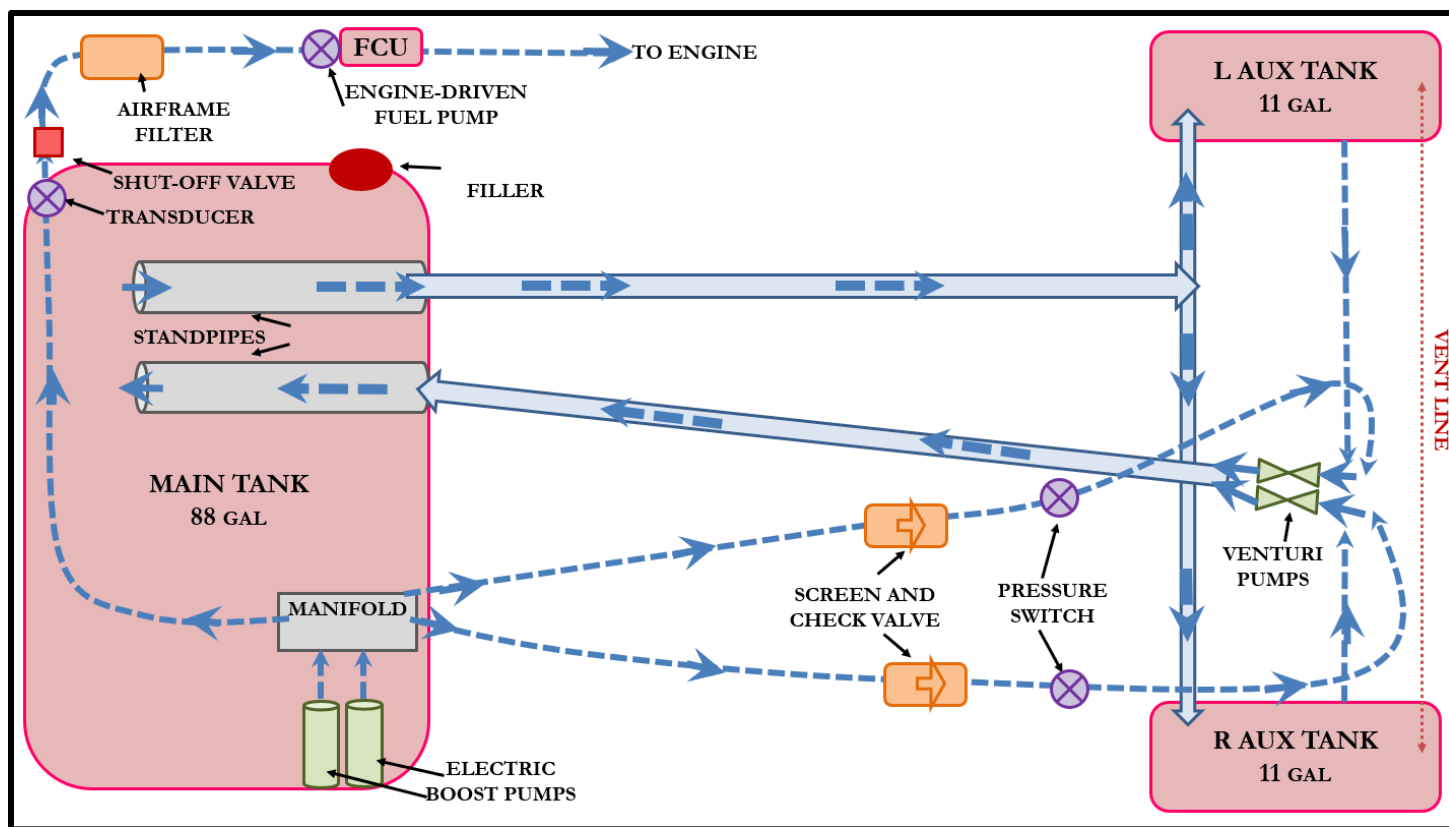


Figure 16: Fuel Diagram

The fuel valve was observed to be in the Open position. The airframe fuel filter was empty of fuel when examined; no particulate was observed in the bottom of the fuel filter canister and the paper filter was also clean. Fuel line connections on the floor between the forward fuel cells and the main (aft) fuel cell were not fractured. The ejector pump assembly and flow switches between the two forward fuel cells were intact. The forward fuel cells were unbreached and contained fuel. It was reported by Erickson that fuel was removed from the fuel cells during recovery and approximately 27 gallons of fuel was removed from both forward and main (aft) cells. The boost pump plate remained attached to the main fuel cell and the pumps appeared to be intact. The main fuel cell was observed to be torn near the boost pump plate in an area of airframe fracturing.

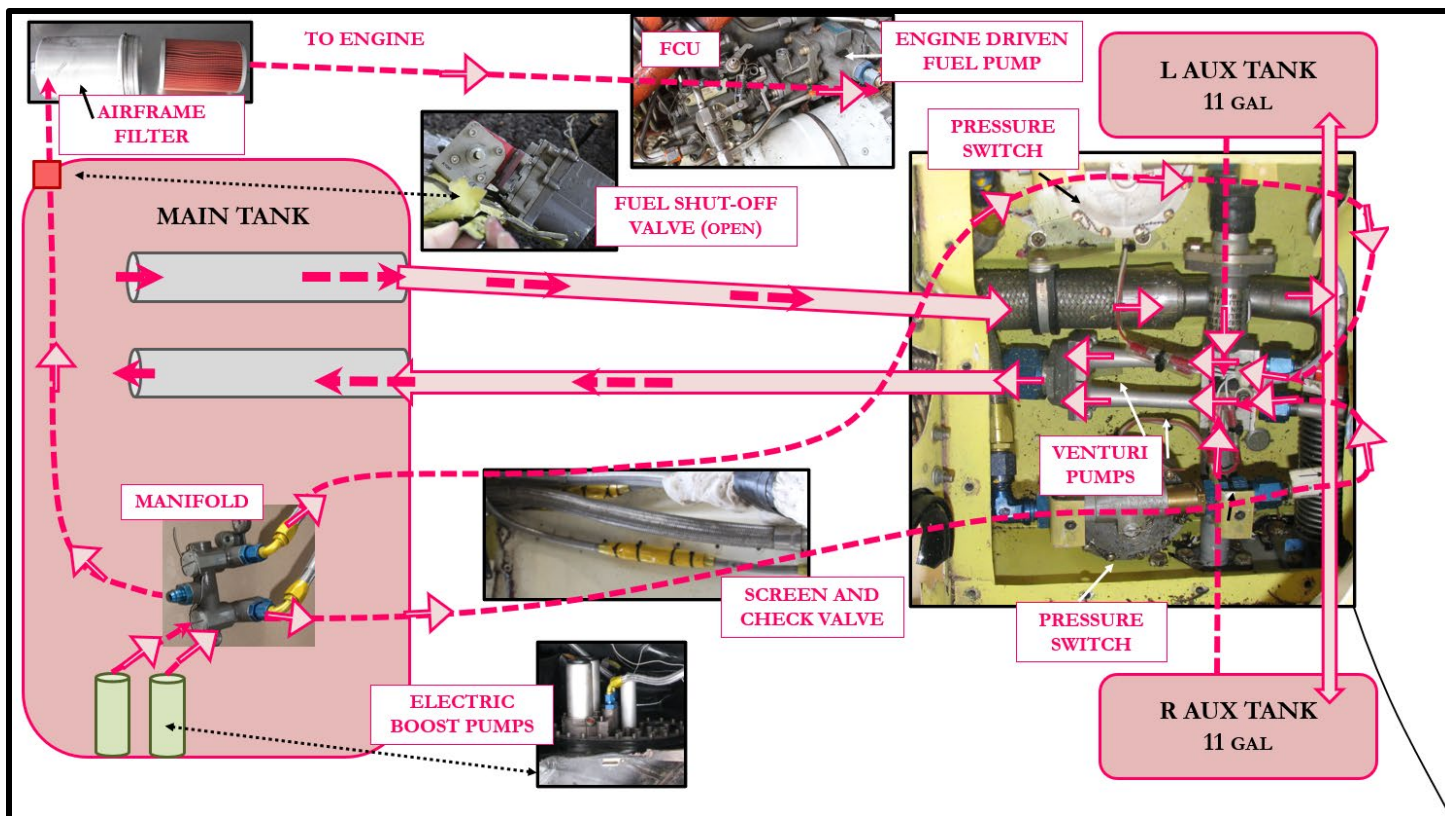


Figure 17: Fuel Examination

MAIN ROTOR DRIVE AND BLADES

The main rotor hub assembly, which remained attached to the mast, was rotated by hand and corresponding free rotation was observed at the main driveshaft input flange on the main transmission. The KaFlex main driveshaft forward coupling was fractured just forward of the freewheeling unit. The aft coupling was fractured with rotational overstress features with rubbing and rotational scoring observed on the KaFlex shaft just aft of the coupling consistent with it making contact with the firewall while turning. The freewheeling unit operated properly when tested by hand while still installed on the helicopter, rotating freely in the drive direction and continuing to rotate when the #4 turbine wheel was stopped by hand through the exhaust.

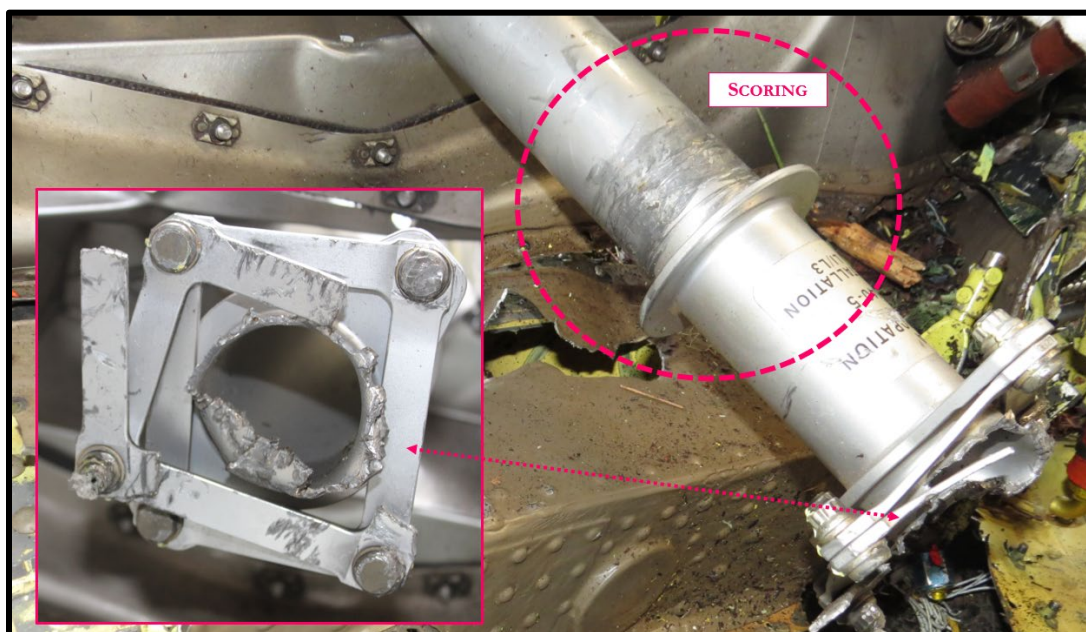


Figure 18: KaFlex Shaft (aft coupling)

The main rotor blades were both attached to the hub and the hub was attached to the mast. Both blades were severed chordwise approximately 5-7 feet outboard of the hub. The mast had approximately a 20-degree bend located parallel to yolk static stops. One pitch change tube was severed in half.

An Alert Service Bulletin, BHT - 206L-ASB-09-159A, from November 2009 stated fatigue crack could occur if there was a combination of both residual stress in the spar and a larger than acceptable void in the adhesive applied between the blade's internal lead inertia weight and the spar, between blade stations 100 and 145. If such a condition exists, a fatigue crack may be induced by the centrifugal force variation that occurs during the helicopter start/stop cycles.



Figure 19: One Main Rotor Blade



Figure 20: Other Main Rotor Blade

TAIL ROTOR DRIVE AND BLADES

The tail rotor hub and blade assembly was attached to the tail rotor output shaft with intact connections to pitch change links. The tail rotor hub was intact. Free pitch change movement was present at both tail rotor blades. Both tail rotor blades exhibited chordwise bending consistent with impact forces. One blade was bent at an inboard location approximately 135° inboard towards the tail rotor gearbox consistent with impact forces. The other tail rotor blade exhibited a slight bend at an inboard location but was otherwise intact.

The tail rotor driveshaft under the engine was intact and remained connected to the engine gearbox on the forward end and had disconnected from the aft end at the oil cooler shaft. Rotation scoring on the shaft was observed from contact with engine parts from above, consistent with occurring during impact when the shaft was turning and deformation of structure enabled contact between the shaft and engine parts. Damage to the splines at the oil cooler were observed, consistent with impact. The oil cooler shaft rotated freely by hand. All aluminum tail rotor driveshaft segments on the tailboom and aft fuselage were intact; the Thomas couplings and hanger bearings were intact. The tail rotor gearbox rotated freely and corresponding rotation of the tail rotor blades was observed, demonstrating drive continuity within the tail rotor gearbox. The gearbox support case with attached tail rotor gearbox had separated from the aft tailboom consistent with impact forces.

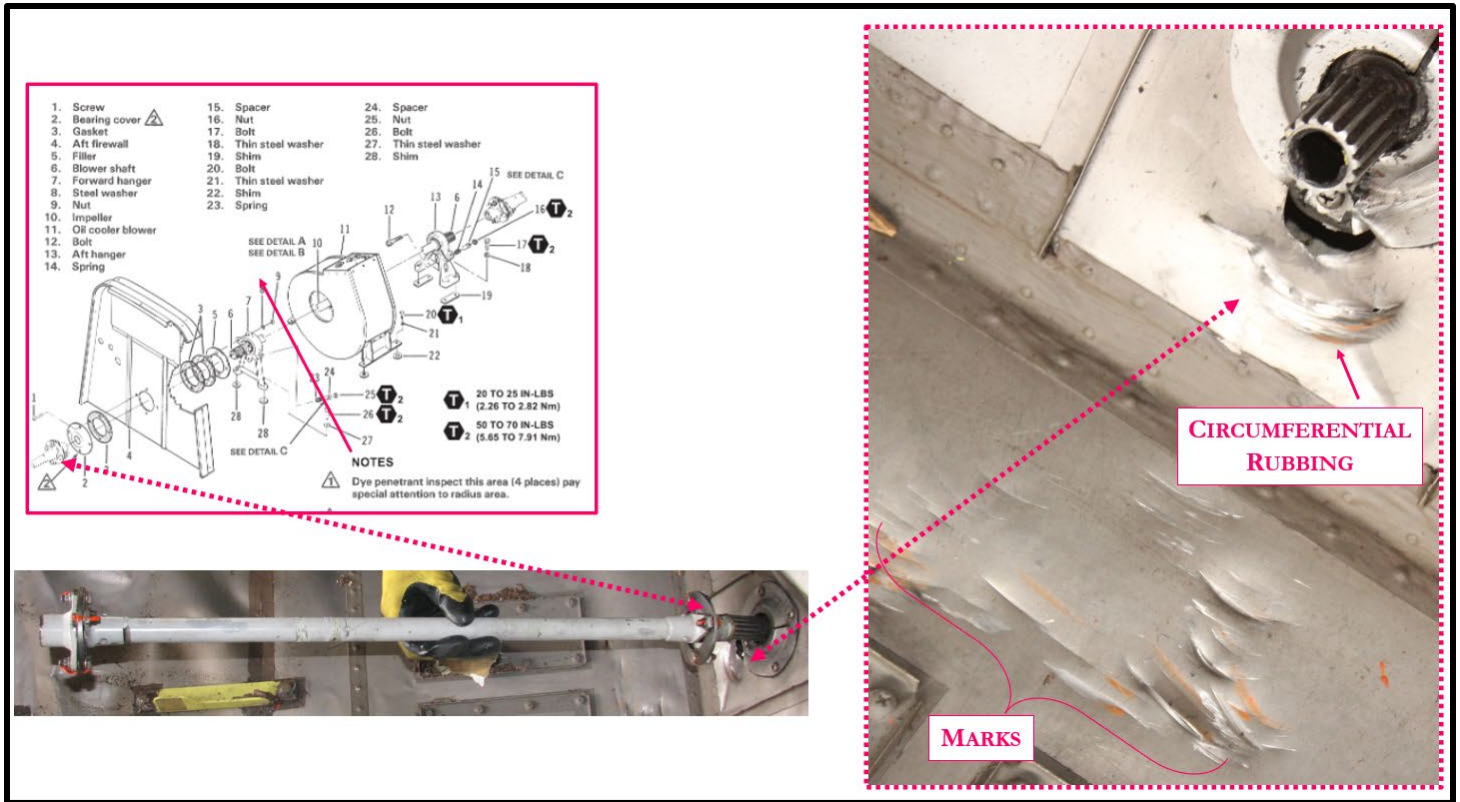


Figure 21: Tail Rotor Drive Shaft (under engine)

PANEL/SWITCHES/INSTRUMENTS/LIGHTS/CIRCUIT BREAKERS

In pertinent part:

- Engine anti-icing- ON
- Hydraulic system- ON
- Torque- pegged over 120%
- Attitude- tumbled
- Position Lights- ON
- Anti-Collision Lights- OFF
- Radio and Master- OFF
- Directional Gyro and Attitude Indicator- OFF

Circuit Breakers Out: COM-2; SAT-PA; RAD ALT; AUX RECPT; TOT IND; GEN RESET

ENGINE

The helicopter was equipped with a Rolls-Royce 250-C30P turbo-shaft engine, part number 23004545 and serial number CAE895368, which had been manufactured in the United States in 1985. The Federal Aviation Administration of the United States was the certificating authority for the engine. The engine was mounted on a deck that formed the cabin roof, and drove a 2-bladed main rotor and a 2-bladed tail rotor through the main transmission.

The Rolls-Royce 250-C30P engine is an internal combustion turboshaft engine featuring a free power turbine. The gas generator is composed of a single stage, single entry centrifugal flow compressor directly coupled to a two-stage gas generator turbine. The power turbine is a two-stage free turbine which is gas coupled to the gas generator turbine. The integral reduction gearbox has front and rear drive splines to mate the helicopter drives. The engine has a single combustion chamber with single ignition. The output shaft centerline is located below the centerline of the engine turbine shafting and the single exhaust outlet is directed upward.

The engine was separated from all of its engine mounts. The N2 rotor was rotated and smoothly turned. Continuity from the 4th-stage power turbine wheel to the power output shaft was established. Continuity was confirmed throughout the N1 rotor system from the compressor impeller to the starter-generator cooling fan. Damage to the cooling fan vanes on the starter-generator initially prevented full rotation of the N1 rotor however, after removal, the rotor turned freely by hand. A borescope was used to verify rotation of the gas producer turbine rotor, which was continuous. The magnetic chip detectors were removed and the inspections revealed that both chip detectors were free of ferrous metal debris. The engine pressure oil filter was removed and inspected. The filter and housing was oil wetted and the filter appeared clean and clear of contamination inside the pleats.

Fuel was detected up to the fuel spray nozzle. Trace amounts of clean, clear fluid consistent with jet fuel was drained from the flex line between the turbine fire shield union fitting and the fuel spray nozzle. The inlet hose to the engine fuel pump appeared to have been fractured in the accident sequence and therefore capturing fuel at the pump inlet was not possible. The airframe mounted fuel filter canister was removed in order to access the filter. The canister was void of fuel and both the canister and filter appeared clear and clean with no sign of dirt or foreign debris. The FCU linkage was fractured at the base of the input arm on the FCU. The position indicator pointer on the FCU was in the "0" position corresponding to OFF. The actuation arm on the FCU could be rotated from stop to stop with no binding or resistance noted. The fuel pump housing on the front of the FCU was fractured 360° just aft of its attachment to the gearbox

RECORDS

A review of the airframe and engine records did not reveal any open discrepancies or anomalies.

Log sheet maintenance discrepancies were reviewed for the last 45 days, including corrective maintenance actions. No open discrepancies or unusual events were noted. There were no deferred maintenance items using the policies and procedures of the Minimum Equipment List (MEL) and Configuration Deviation List (CDL), during the last 45 days. The computerized listing for major repair and alterations was examined, and no discrepancies were noted.

PILOT INFORMATION

TIMOTHY BRUCE LYONS.

The pilot, age 69, was certified to fly the Bell 206 helicopter in accordance with existing Federal Aviation Regulations (FAR). A review of the FAA Airman and Medical Records database disclosed that the pilot held an airline transport pilot certificate for helicopter rotorcraft; the certificate listed type ratings for A/BH-204, A/BH-206, A/BV-234, A/S-330. His second-class medical certificate was issued on February 2018, with the limitation that he must wear corrective lenses for near and distant vision.

The pilot's regular schedule was to work in Guam for six-weeks and then be off work for six-week. He had just finished his six-week rotation and arrived in Medford the evening of January 21 with the intention of building hours. The following was the company's records for the year to date:

Crew Name	AC Type	Act Blk	Act Flt	Day	Night	IFR	VFR	T/O	LNDG	T/O Day	T/O Night	LNDG Day
LYONS, TIMOTHY	ALL	83.9	83.9	83.9	0	0	0	0	0	0	0	0
	LNDG Night	PREC	N-PREC	PIC	SIC							
	0	0	0	69.7	14.2							
Crew Name	Trip#	Reg#	From	To	Date Out (Z)	Out (Z)	Off (Z)	On (Z)	In (Z)	Date In (Z)	Act Blk (H.T)	Act Flt (H.T)
LYONS, TIMOTHY	1560	N8227J	KMFR	KMFR	22-Jan-19	17:30	17:30	20:30	20:30	22-Jan-19	3	3
LYONS, TIMOTHY	1560	N8227J	KMFR	KMFR	22-Jan-19	23:00	23:00	1:00	1:00	23-Jan-19	2	2
LYONS, TIMOTHY	1450	N366EV	PGUM	PGUM	23-Dec-18	6:55	6:55	7:25	7:25	23-Dec-18	0.5	0.5
LYONS, TIMOTHY	1450	N366EV	PGUM	PGUM	22-Dec-18	21:25	21:25	6:54	6:54	23-Dec-18	9.5	9.5
LYONS, TIMOTHY	1273	N8227J	KMFR	KMFR	25-Oct-18	16:15	16:15	19:30	19:30	25-Oct-18	3.3	3.3
LYONS, TIMOTHY	1273	N8227J	KMFR	KMFR	25-Oct-18	21:15	21:15	0:20	0:20	26-Oct-18	3.1	3.1
LYONS, TIMOTHY	1260	N8227J	KMFR	KMFR	24-Oct-18	16:23	16:23	20:00	20:00	24-Oct-18	3.6	3.6
LYONS, TIMOTHY	1267	N8227J	KMFR	KMFR	24-Oct-18	22:15	22:15	0:30	0:30	25-Oct-18	2.3	2.3
LYONS, TIMOTHY	1246	N367EV	PGUM	PGUM	22-Oct-18	2:20	2:20	2:45	2:45	22-Oct-18	0.4	0.4
LYONS, TIMOTHY	1246	N367EV	PGUM	PGUM	22-Oct-18	3:00	3:00	4:05	4:05	22-Oct-18	1.1	1.1
LYONS, TIMOTHY	1144	N366EV	KMFR	KMFR	14-Sep-18	15:00	15:00	18:26	18:26	14-Sep-18	3.4	3.4
LYONS, TIMOTHY	1141	N367EV	KMFR	KMFR	12-Sep-18	13:00	13:00	13:18	13:18	12-Sep-18	0.3	0.3
LYONS, TIMOTHY	1141	N367EV	KMFR	KMFR	12-Sep-18	13:30	13:30	14:12	14:12	12-Sep-18	0.7	0.7
LYONS, TIMOTHY	1072	N8227J	KMFR	KMFR	15-Aug-18	15:30	15:30	18:55	18:55	15-Aug-18	3.4	3.4
LYONS, TIMOTHY	1072	N8227J	KMFR	KMFR	15-Aug-18	21:00	21:00	0:42	0:42	16-Aug-18	3.7	3.7
LYONS, TIMOTHY	1070	N8227J	KMFR	KMFR	14-Aug-18	16:40	16:40	20:10	20:10	14-Aug-18	3.5	3.5
LYONS, TIMOTHY	1070	N8227J	KMFR	KMFR	14-Aug-18	22:40	22:40	2:10	2:10	15-Aug-18	3.5	3.5
LYONS, TIMOTHY	1064	N10248	KMFR	KMFR	13-Aug-18	13:00	13:00	15:12	15:12	13-Aug-18	2.2	2.2
LYONS, TIMOTHY	1067	N8227J	KMFR	KMFR	13-Aug-18	23:30	23:30	2:00	2:00	14-Aug-18	2.5	2.5
LYONS, TIMOTHY	1061	N10248	KMFR	KMFR	12-Aug-18	13:00	13:00	14:00	14:00	12-Aug-18	1	1
LYONS, TIMOTHY	1063	N10248	2OG2	KMFR	12-Aug-18	18:10	18:10	18:35	18:35	12-Aug-18	0.4	0.4
LYONS, TIMOTHY	873	N366EV	KMFR	KMFR	14-Jun-18	10:00	10:00	10:48	10:48	14-Jun-18	0.8	0.8
LYONS, TIMOTHY	709	N367EV	KMFR	KMFR	12-Apr-18	10:00	10:00	10:30	10:30	12-Apr-18	0.5	0.5
LYONS, TIMOTHY	693	N367EV	KMFR	KMFR	12-Apr-18	10:00	10:00	10:30	10:30	12-Apr-18	0.5	0.5
LYONS, TIMOTHY	661	N366EV	KMFR	KMFR	29-Mar-18	17:00	17:00	22:30	22:30	29-Mar-18	5.5	5.5
LYONS, TIMOTHY	647	N367EV	KMFR	KMFR	26-Mar-18	17:00	17:00	17:10	17:10	26-Mar-18	0.2	0.2
LYONS, TIMOTHY	638	N366EV	KMFR	KMFR	25-Mar-18	15:00	15:00	15:20	15:20	25-Mar-18	0.3	0.3
LYONS, TIMOTHY	639	N366EV	KMFR	KMFR	25-Mar-18	16:00	16:00	16:20	16:20	25-Mar-18	0.3	0.3
LYONS, TIMOTHY	640	N366EV	KMFR	KMFR	25-Mar-18	17:00	17:00	17:20	17:20	25-Mar-18	0.3	0.3
LYONS, TIMOTHY	641	N366EV	KMFR	KMFR	25-Mar-18	18:00	18:00	18:25	18:25	25-Mar-18	0.4	0.4
LYONS, TIMOTHY	568	N8227J	KMFR	KMFR	2-Mar-18	16:50	16:50	18:40	18:40	2-Mar-18	1.8	1.8
LYONS, TIMOTHY	567	N8227J	KMFR	KMFR	1-Mar-18	12:00	12:00	15:00	15:00	1-Mar-18	3	3
LYONS, TIMOTHY	566	N8227J	KMFR	KMFR	28-Feb-18	10:00	10:00	12:00	12:00	28-Feb-18	2	2
LYONS, TIMOTHY	566	N8227J	KMFR	KMFR	28-Feb-18	14:00	14:00	15:44	15:44	28-Feb-18	1.7	1.7
LYONS, TIMOTHY	560	N8227J	KMFR	KMFR	27-Feb-18	10:00	10:00	14:55	14:55	27-Feb-18	4.9	4.9
LYONS, TIMOTHY	561	N8227J	KMFR	KMFR	26-Feb-18	9:00	9:00	11:00	11:00	26-Feb-18	2	2
LYONS, TIMOTHY	561	N8227J	KMFR	KMFR	26-Feb-18	13:00	13:00	15:25	15:25	26-Feb-18	2.4	2.4
LYONS, TIMOTHY	555	N8227J	KMFR	KMFR	25-Feb-18	9:00	9:00	9:30	9:30	25-Feb-18	0.5	0.5
LYONS, TIMOTHY	555	N8227J	KMFR	KMFR	25-Feb-18	12:00	12:00	15:25	15:25	25-Feb-18	3.4	3.4
Total											83.9	83.9

Figure 22: Pilot's Hours Year-to-Date

EMPLOYMENT HISTORY

2010: Contract Navy Vertrep Pilot: Evergreen Helicopters; VFR/IFR S330J Puma.

1997 - 2008: Contract Pilot: PHI, Evergreen.; VFR/IFR Offshore, Firefighting, LongLine Bell 206, 212, 407, Sikorsky SK76

2002 - 2004: Firefighting & Contract Navy Vertrep Pilot: Geo Seis Helicopters; VFR/IFR S330J.

1997: Long Line Pilot: Pacific Helicopters; Bell 212 in Papua New Guinea.

1996: Firefighting Pilot: Crew Concepts; Bell 212

1992 -1996: EMS Pilot: Corporate Jets; Single Pilot IFR Bell 222 & B0105.

1988 - 1992: Offshore Pilot: Air Logistics; VFR/IFR Sikorsky S76, Bell 206. 212, 412 & BOLOS.

1985 - 1988: Pilot: Lockheed-Arabia; VFR/IFR KV107 VIP, Firefighting, EMS, External Load.

1973 - 1992: Pilot: United States Marine Corps & Army Reserves; UH1, CH46, CH47

WEATHER INFORMATION

Cameras were located at the nearby ski mountain, Mt. Ashland.

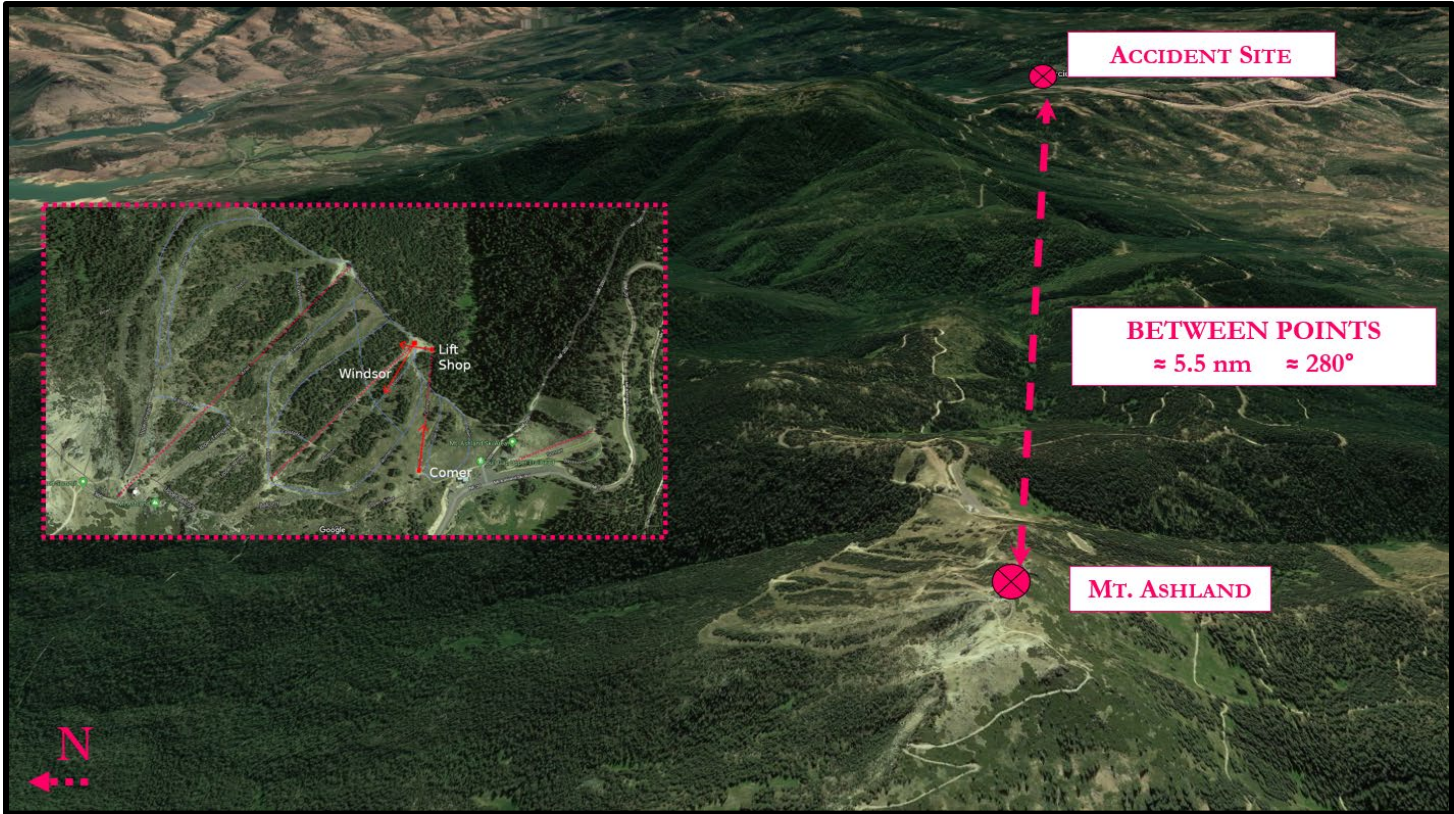


Figure 23: Cameras in Relation to Accident Site

Date	Time (LST)	Remarks
23	0053	MET09901/23/19 00:53:02 METAR KMFR 230853Z 19005KT 10SM OVC046 03/01 A3049 RMK AO2 SLP331 T00280006 50009
23	0100	SYN06472597 35666 81905 10028 20006 39851 40331 50009 90853 555 92309=
23	0153	MET09301/23/19 01:53:02 METAR KMFR 230953Z 00000KT 10SM OVC041 03/01 A3047 RMK AO2 SLP326 T00330006
23	0253	MET09301/23/19 02:53:02 METAR KMFR 231053Z 05004KT 10SM OVC042 03/02 A3047 RMK AO2 SLP324 T00330017
23	0353	MET13101/23/19 03:53:02 METAR KMFR 231153Z 01003KT 8SM OVC040 03/02 A3046 RMK AO2 RAB01E48 SLP320 P0000 60000 T00330017 10039 20011 56009
23	0400	SYN07072597 15662 80103 10033 20017 39841 40320 56009 69901 91153 555 92312=
23	0453	MET11501/23/19 04:53:02 METAR KMFR 231253Z 00000KT 10SM SCT040 OVC050 04/02 A3046 RMK AO2 RAB13E24 SLP320 P0000 T00390017
23	0553	MET09801/23/19 05:53:02 METAR KMFR 231353Z 21003KT 10SM OVC060 04/02 A3045 RMK AO2 SLP318 T00390022 (WS)
23	0653	MET11701/23/19 06:53:02 METAR KMFR 231453Z 15004KT 10SM SCT055 OVC070 04/02 A3045 RMK AO2 SLP318 60000 T00390022 58003 (WS)
23	0700	SYN07072597 12766 81504 10039 20022 39838 40318 58003 69907 91453 555 92315=
23	0753	MET10501/23/19 07:53:02 METAR KMFR 231553Z 00000KT 10SM SCT039 BKN048 04/02 A3046 RMK AO2 SLP323 T00440022 (WS)
23	0809	MET10401/23/19 08:09:02 SPECI KMFR 231609Z 00000KT 7SM SCT014 BKN026 OVC045 04/02 A3047 RMK AO2 T00440022 (WS)
23	0820	MET10401/23/19 08:20:02 SPECI KMFR 231620Z 00000KT 7SM BKN012 BKN017 OVC060 04/02 A3047 RMK AO2 T00440022 (WS)
23	0853	MET13001/23/19 08:53:02 METAR KMFR 231653Z 00000KT 4SM -RA BR BKN012 BKN021 OVC050 04/02 A3048 RMK AO2 RAB40 SLP328 P0000 T00440022 (WS)
23	0953	MET14301/23/19 09:53:02 METAR KMFR 231753Z 00000KT 5SM -RA BR OVC011 05/03 A3049 RMK AO2 RAE00B43 SLP334 P0000 60000 T00500028 10050 20033 53015 (WS)
23	1000	SYN08672597 11458 80000 10050 20028 39851 40334 53015 69901 7611/ 91753 333 96010 555 92318=
23	1053	MET12401/23/19 10:53:02 METAR KMFR 231853Z 00000KT 10SM BKN014 BKN023 OVC055 06/03 A3051 RMK AO2 RAE22 SLP339 P0000 T00560033 (WS)
23	1100	MET10001/23/19 11:00:02 SPECI KMFR 231900Z 26003KT 4SM BR BKN009 OVC014 06/03 A3051 RMK AO2 T00560033 (WS)
23	1153	MET11501/23/19 11:53:02 METAR KMFR 231953Z 00000KT 4SM HZ OVC009 07/04 A3050 RMK AO2 RAB02E30 SLP336 P0000 T00670039 (TZ)
23	1253	MET11601/23/19 12:53:02 METAR KMFR 232053Z 00000KT 9SM BKN006 BKN034 07/05 A3048 RMK AO2 SLP328 60000 T00720050 58005 (TZ)

The pilot’s kneeboard writings was consistent with the 0853 METAR at Medford:
MVFR METAR KMFR 231653Z 00000KT 4SM -RA BR BKN012 BKN021 OVC050 04/02 A3048 RMK AO2 RAB40

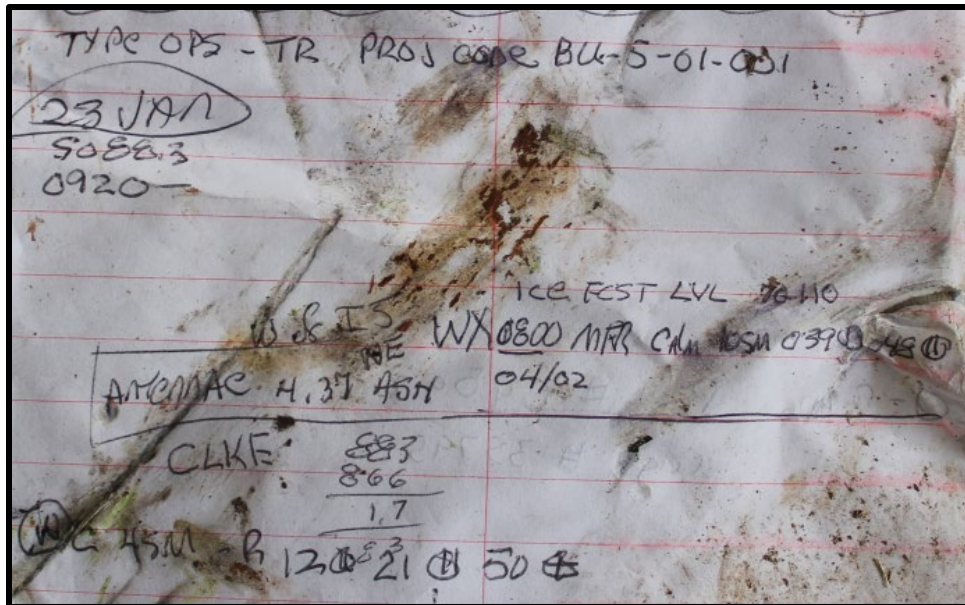


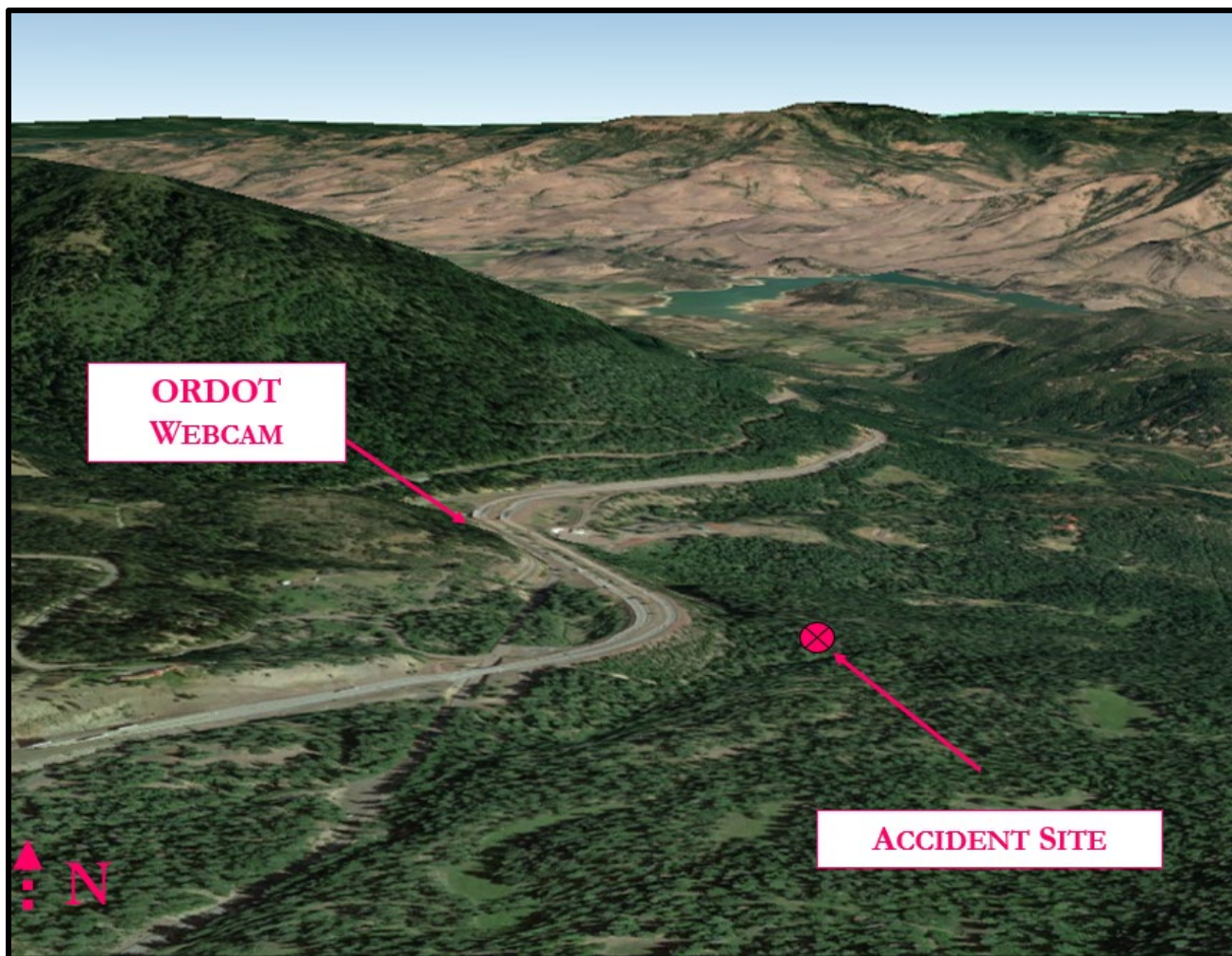
Figure 24: Pilot's Kneeboard Notes

Latitude	Longitude	Elevation	Local Time	Temp	Dew Pt	Rel Humdy	Baro Prs	Wind Spd	Wind Gust	Wind Dir	Wind Gust	Srf Temp	Srf Chem
4206320	-12260310	4300	2019/01/23 10:00	36.9F	31F	77%	8907 in.	1 mph	2 mph	NE	N	39.9F	5
4206320	-12260310	4300	2019/01/23 10:15	36.5F	31F	78%	8907 in.	0 mph	2 mph	E	SE	40.1F	10
4206320	-12260310	4300	2019/01/23 10:30	37.0F	31F	79%	8907 in.	0 mph	3 mph	E	N	40.5F	10
4206320	-12260310	4300	2019/01/23 10:45	37.6F	32F	80%	8907 in.	1 mph	4 mph	SW	N	41.2F	10
4206320	-12260310	4300	2019/01/23 11:00	38.1F	33F	81%	8901 in.	0 mph	3 mph	NE	NW	41.9F	10
4206320	-12260310	4300	2019/01/23 11:15	38.1F	33F	81%	8901 in.	1 mph	3 mph	NE	N	42.1F	10
4206320	-12260310	4300	2019/01/23 11:30	38.5F	33F	81%	8919 in.	3 mph	4 mph	NE	NE	42.6F	5
4206320	-12260310	4300	2019/01/23 11:45	38.7F	34F	82%	8919 in.	1 mph	4 mph	N	E	43.7F	10
4206320	-12260310	4300	2019/01/23 12:00	38.7F	34F	83%	8925 in.	1 mph	4 mph	NE	SE	43.3F	5

The Oregon Department of Transportation (ODOT) webcam 45, located about 3,300 ft northwest of the accident site streamed the weather the day of the accident, but the images are not recorded. Weather Underground recorded the image at 0943 the day of the accident.



Figure 25: ODOT Webcam near the Accident



ADDITIONAL INFORMATION

Hobbs at departure: 5088.3 time 0920

Hobbs at accident: 5090.6 time 1143

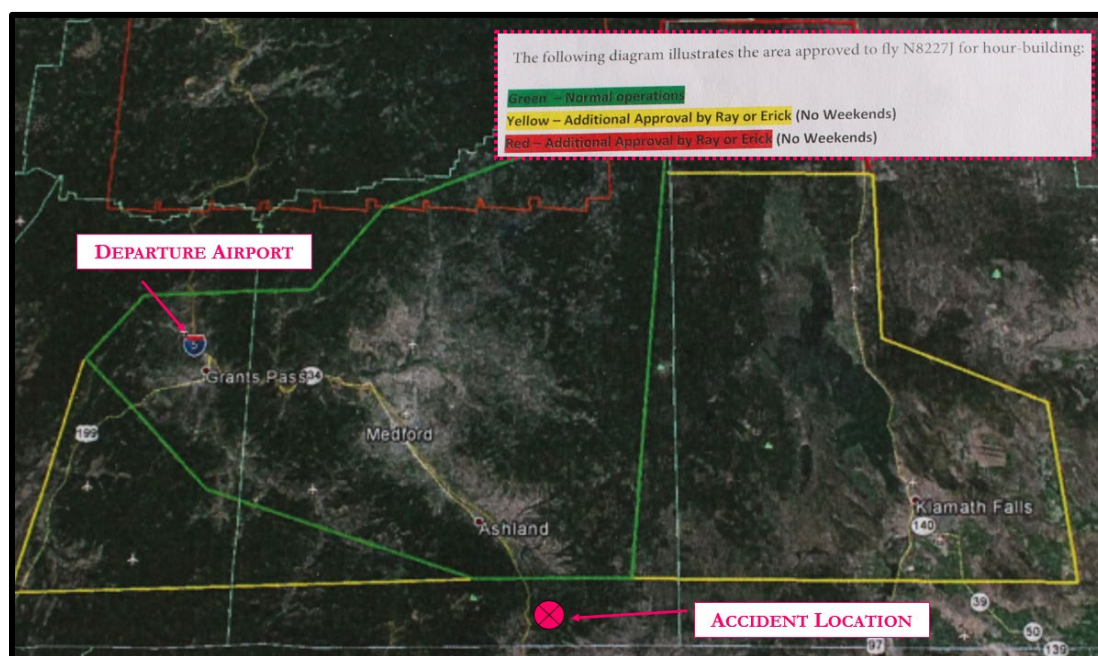


Figure 26: Erickson Approved Hour-Building Approved Area

DATE: 23 JAN 2019		LOCATION: MFR		0	
N# 8227J		FSO# 19023			
PIC LYONS		0		SIC	
☐ Daily Risk Assessment or Crew Change			☒ Individual Flight (Check / fill in customer below)		
RISK FACTOR	N/A	LOW RISK	MEDIUM RISK	HIGH RISK	
MISSION PLANNING	☐	Clear Mission/Aircraft ☒	Short notice change in mission or aircraft ☐	No guidance or planning evident ☐	
EQUIPMENT	☐	0 - 1 open MEL items, with none relating to operation ☒	MEL items open but not relating to mission ☐	Open items that prohibit operation by MEL ☐	
FLT/DUTY LIMITATIONS	☐	10 Hrs. of rest ☒	End of crew day or flying with minimum rest ☐	Less than 10 hours rest, Crew Day > 14 hours ☐	
PIC Time in Type	☐	More than 200 hours in type ☒	Between 50 and 200 in type ☐	Less than 50 hours in type (See Note 1 below) ☐	
PIC Area Operation Qualified	☐	More than 50 hours in type of operation ☒	10-50 hours in type of operation ☐	Less than 10 hours in type of operation ☐	
PIC Currency VFR	☐	Less than 11 months since recurrent training ☒	12 months since recurrent training ☐	More than 13 months since recurrent training ☐	
PIC Currency IFR	☐	Less than 5 months since recurrent training ☒	6 months since recurrent training ☐	More than 7 months since recurrent training ☐	
PIC Night Unaided Currency	☒	Last Night < 60 days ☐	Last Night 60-90 days ☐	Last night > 90 days ☐	
PIC Experience NVG	☒	> 50 NVG hours ☐	25-50 NVG hours ☐	< 25 NVG hours ☐	
Visibility Night	☐	> 3 miles ☒	2-3 miles ☐	< 2 miles ☐	
Day	☐	> 1 mile ☐	1/2 - 1 mile ☐	< 1/2 mile ☐	
Icing (forecast/known)	☐	None ☒	Icing was forecast but current weather indicates that conditions changed ☐	Known Icing VFR or Known Icing / Forecasted for IFR ☐	
Ceiling (forecast and current) (SVFR Day)	☐	> 500 ☒	300-500 ☐	< 300 ☐	
OAT (forecast/current)	☐	> -10 or < 30c ☒	-10 to -40 or 30 to 50c ☐	Beyond RFM limits ☐	
Fuel remaining after job	☐	> 40 min reserve ☒	20-40 min VFR, 30-40 IFR reserve ☐	Less than 20 min VFR/30 Min IFR reserve ☐	
Other Factors (explain in Remarks)	☐	No unusual factors ☒	Could be questionable ☐	High, uncontrolled risk ☐	
Self-assessment				Any of the following:	
Injury	☐	No Injury ☒	Injury does not affect safety ☐	Injury that affects performance, Medication (unless approved), Sleep < 6 hours, Alcohol or effects, Heavy Fatigue, Major Emotional Factors (death in family, active crew conflict, etc.) ☐	
Medication	☐	No medication ☒	Authorized medication ☐		
Sleep	☐	Sleep over 7 hours ☒	Sleep 6-7 hours ☐		
Alcohol	☐	No Alcohol or lingering effects ☒	No Alcohol or effects ☐		
Fatigue	☐	No Fatigue ☒	Slight Fatigue ☐		
Emotional	☐	No Emotional Factors ☒	Emotional Factors minor ☐		
RISK FACTOR		Number of Yellows	ACTION		
☒ LOW RISK		0 - 3	Pilot level approval		
☐ MEDIUM RISK		4 - 5	Tier 1 or Tier 2 Management approval.		
☐ HIGH RISK		6 or more	Cancel - Any No-Go item requires flight cancellation.		
Be sure to reference the FSO#			Flight Cancelled:		
Flight Remarks:			☐ WX ☐ Other ☐ Customer Request ☐ A/C MX		
Maintenance			Expanded Cancellation Comments:		
NOTE 1: For FAR Part 91/133 OPS, Company approval required.					
Management Reviewed for Medium Risk:					
☐ YES MGRs Name					

Figure 27: Pilot's Risk Assessment for the Flight