

National Transportation Safety Board

Office of Aviation Safety

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WRECKAGE EXAM

December 5, 2024

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A. ACCIDENT

Location: Remote Location
Date: August 31, 2024
Time: 10:00
18:00
Airplane: PA-18 150, N7154Z

B. WRECKAGE EXAM

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C. SUMMARY

On August 31, 2024, about 1000 Alaska daylight time, a Piper PA-18-150 airplane, N7154Z, sustained substantial damage when it was involved in an accident near McGrath Alaska. The pilot was fatally injured. The airplane was operated as a *Title 14 Code of Federal Regulations Part 91* flight.

The airplane departed base camp at about 9:30 the morning and traveled to a 2,500' ridge about 2.5 SM away to drop off supplies to his hunting guide; the pilot was planning to continue to McGrath for fuel. According to the guide, the airplane flew over their camp several times and then executed several slow and low passes of the ridge in an X pattern likely trying to determine wind and landing site conditions. The pilot had landed on this ridge many times over the years, this was the first landing of the season.

The guide reported the winds to be about 15 mph from the northeast and good visibility. The guide said the airplane was traveling slow and low level on a southwest heading and was beginning a right turn to the northeast. As the airplane began what the guide thought to be a right base to final turn the guide lost site of the plane, however, he could still hear the engine. He reported hearing the engine call for a lot of power twice and a few seconds later he heard what he believed was the airplane impacting the ground.

D. DETAILS OF THE INVESTIGATION

1.0 Accident Site

The accident occurred on a remote landing strip located at 2,500'. The terrain is a rocky, undulating ridge located about 61 miles southeast of McGrath Alaska (Figure 1).

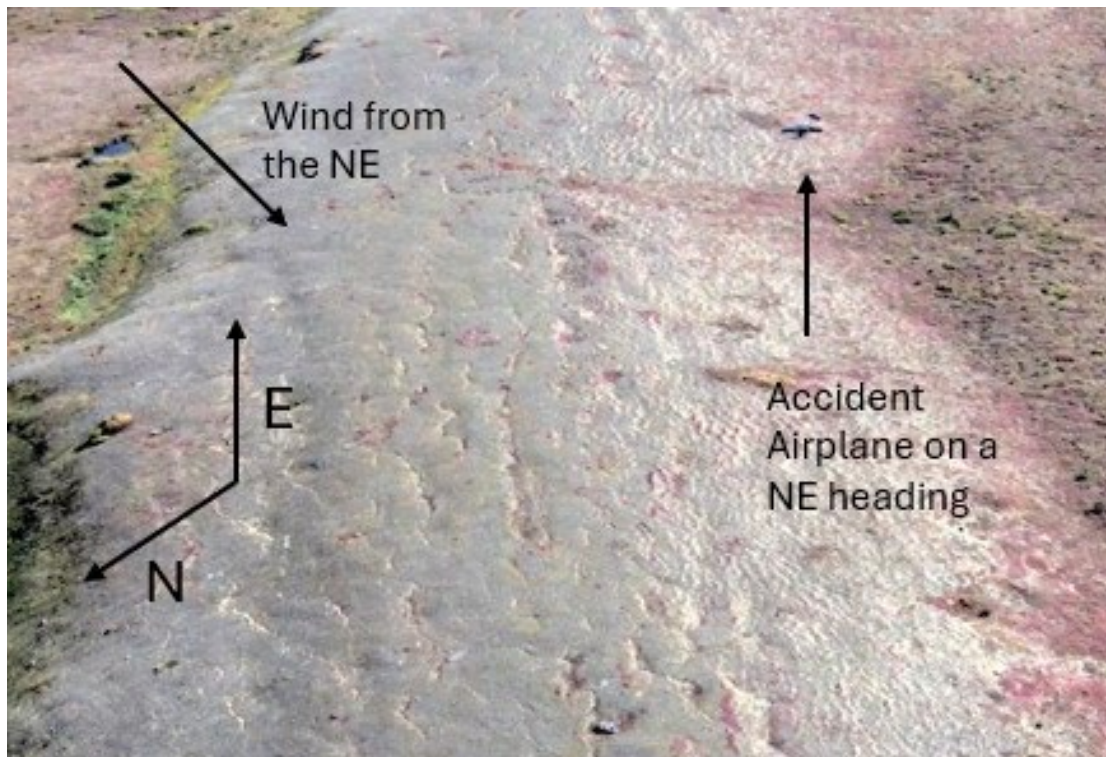


Figure 1 Accident Ridge

2.0 Airframe Examination

On September 2, 2024, an on site airframe examination was conducted by the IIC. The airplane was found on the south side of the ridge on a northeast heading. The airplane was in a near vertical position with the tail bent slightly to the right (Figure 2). The right wing tip had impact damage signatures, indicating it impacted the ground prior to the left wing. The left wing leading edge had little impact damage.



Figure 2 Accident airplane

Fuel was present in both wings, the amount could not be determined.

Control cable continuity from the rudder to the cockpit was observed, the pedals were deformed, and continuity could not be determined. Control cable continuity from both the left and right ailerons and flaps to the cockpit was confirmed. The flight controls were damaged and continuity to the control surfaces could not be confirmed.

The throttle position was observed to be in the almost full off (aft) position. Carburetor heat control knob was observed to be in the full closed position. The fuel mixture control knob was in the full rich (closed) position. The fuel valve selector was observed to be on both tanks. Throttle and carb heat control continuity to the engine could not be determined due to engine damage.

The trim position indicator was observed to be in the full nose down position, the jack screw position could not be determined because the tail section was inaccessible.

The flap handle position could not be verified because it was damaged during impact.

PSTOL flaps were installed on the airplane and the left wing flap was in the full down position. The fuselage impacted the right wing flap and the flap was observed to be in the full up position.

The engine compartment was not accessible because of the orientation of the airplane. One section of Sensenich propeller blades was found buried in the dirt under the propeller flange, the other section of propeller blade could not be located.

2.1 Fuselage

A detailed airframe and engine examination was conducted on December 4, 2024.

The Piper PA-18 150 airplane, N7154Z, SN 18-8268 was presented with the wings removed (Figure 3). The Northern Airframes, LLC widebody fuselage, FAA PMA P/N AF18 serial number 078 was modified with a metal bottom cover, but was fabric covered otherwise. The fuselage was impact damaged throughout, with concentrated impact damage aft of the cabin area where the frame buckled. The fuselage frame had been cut in several places by the recovery personnel.



Figure 3 Accident airplane at wreckage exam

The cabin door was attached to the fuselage and was impact damaged with bending at the middle of the door. The pilot seat was removed from the cockpit, the seat frame was impact damaged and broken. The aft seat was likely not installed during the accident flight to accommodate oversize cargo. Two plastic 55 gallon drums and a small empty propane tank were in the aft cabin area. The drums were almost empty with a trace amount of 100LL avgas. The modified baggage door remained attached to the fuselage and was unremarkable. The fuselage was equipped with an extended baggage compartment modification.

Fabric was removed along the left side of the tail section to expose the rudder and elevator cables and pulley system. The cables and pulleys were intact and continuity to the cockpit was confirmed. The trim indicator wire was fabricated from .032" galvanized wire and was found to be broken mid-way down the tail section. The pitch trim indicator pin was in the full nose-down position during the on-scene examination. The lower portion of the pitch trim jackscrew had approximately 10 threads exposed, which equates to a neutral to slightly nose down setting (Figure 4). 8 threads is consistent with a neutral setting. 17 threads is consistent with a full nose down setting.



Figure 4 Jack screw

2.2 Empennage

The empennage remained attached to the fuselage with minor damage (Figure 5). The vertical and horizontal stabilizers were oversized surfaces. The tail wheel was a modified Acme Aero tail wheel assembly with a hydraulic strut. The right spring chain was attached to the tail wheel assembly with paracord; otherwise, the tail wheel assembly was unremarkable. Alaskan Bushwheel Inc. FAA PMA Part Number PQ1557NM ABI-3200B Bush wheel assembly serial number 400052 was installed.

The horizontal stabilator was modified with vortex generators. The horizontal stabilizer remained attached at the hinges. The pitch trim control cables remained attached to the trim control wheel and the trim actuator. The trim actuator remained attached to the stabilizer bar. The tension rods remained attached and unremarkable.



Figure 5 Empennage

The elevators remained attached to the horizontal stabilizers. The control cables remained attached to the elevators. Control cable continuity was confirmed from the elevators to the cockpit controls and the elevators were moved with the control cables during the examination.

The rudder remained attached to the vertical stabilizer at the hinges. Control cable continuity was confirmed to the rudder pedals in the cockpit, and the rudder was moved with the cables during the examination.

2.3 Wings

The left wing had impact damage throughout, concentrated at the leading edge. The wing struts were cut for recovery near the fuselage and were unremarkable otherwise. A rifle case was mounted to the wing struts. The left main fuel tank was not breached, hydraulic deformation consistent with impact with fuel in the tank was observed. The fuel cap was equipped with a vent pipe. The vent was clear of obstructions when low pressure air was passed through the vent. The fuel cap gasket was intact and pliable.

The left aileron was attached to the wing at both hinges. The stops were intact and unremarkable. The aileron was impact damaged. Control cable continuity was confirmed to both the drive and balance cables at the wing root area. The aileron was operated by moving the cables.

Airframes Alaska, LLC FAA PMA double slotted flaps Part number PSTOL-0001 were installed on both wings (figure 7, 10). The flaps are spring loaded and require cable tension to maintain full flap extension. The left-wing flap was observed to be fully extended at the time of the accident, the control cable from the flap to the flap lever was attached at the accident site (Figure 6). The modified left inboard flap hinge rod was impact separated. The flap remained attached to the wing at both hinges. The flap was impact damaged.



Left wing PSTOL flap control cable intact from control lever in cockpit to flap at accident site. Left wing flap fully extended.

Figure 6 Left wing PSTOL flap with cable attached



Figure 7 Left wing PSTOL flap data tag

Micro Aerodynamics, Inc Vortex Generators were installed on the leading edge of both wings as well as the underside of the horizontal stabilizers. The left wing outboard section was missing 8 consecutive vortex generators. One detached vortex generator was observed in a recovery bag. It could not be determined if the vortex generators departed due to impact or if they were missing prior to impact.

The left wing spar was observed to have a modified spar cap installed on the top of the spar near the wing strut attachment area consistent with an increased gross weight modification. Fabric was removed from a section of the wing, a spar cap for the WipAire 2,000 lb gross weight increase STC was observed to be installed (Figure 8).

Aileron and flap cables and pulleys were inspected, and control continuity was confirmed to the fuselage.

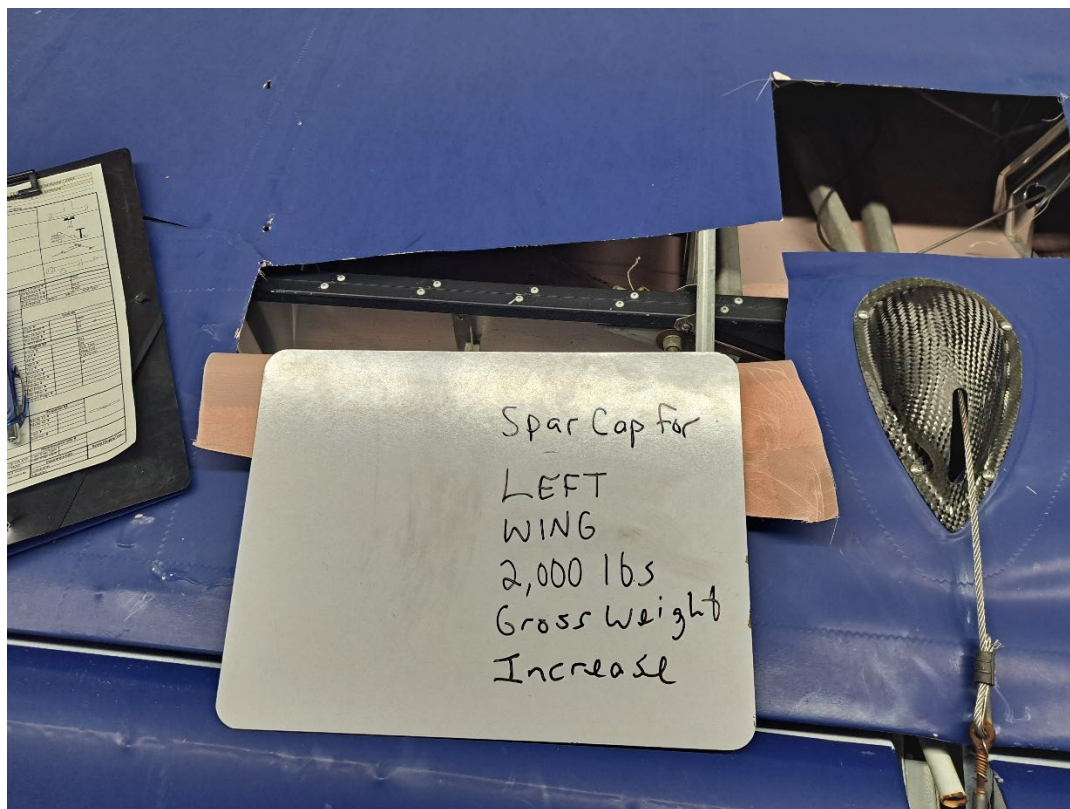


Figure 8 Left wing spar cap for gross weight increase

The right wing had impact damage throughout, concentrated at the leading edge and near the outboard area of the wing. The outboard section of the wing was bent upward, consistent with damage from a right wing low initial impact. The wing struts were cut for recovery near the fuselage but were unremarkable otherwise. A rifle case was mounted to the wing struts. The right main fuel tank was not breached hydraulic deformation consistent with impact with fuel in the tank was observed. The

fuel tank contained liquid that was not tested due to the aircraft being stored outside with the fuel cap removed. The fuel cap was equipped with a vent pipe. The vent was clear of obstructions when low pressure air was passed through the vent. The fuel cap gasket was intact and pliable.

The wing spar was observed to have a modified spar cap installed on the top of the spar near the wing strut attachment area consistent with an increased gross weight modification (Figure 9).

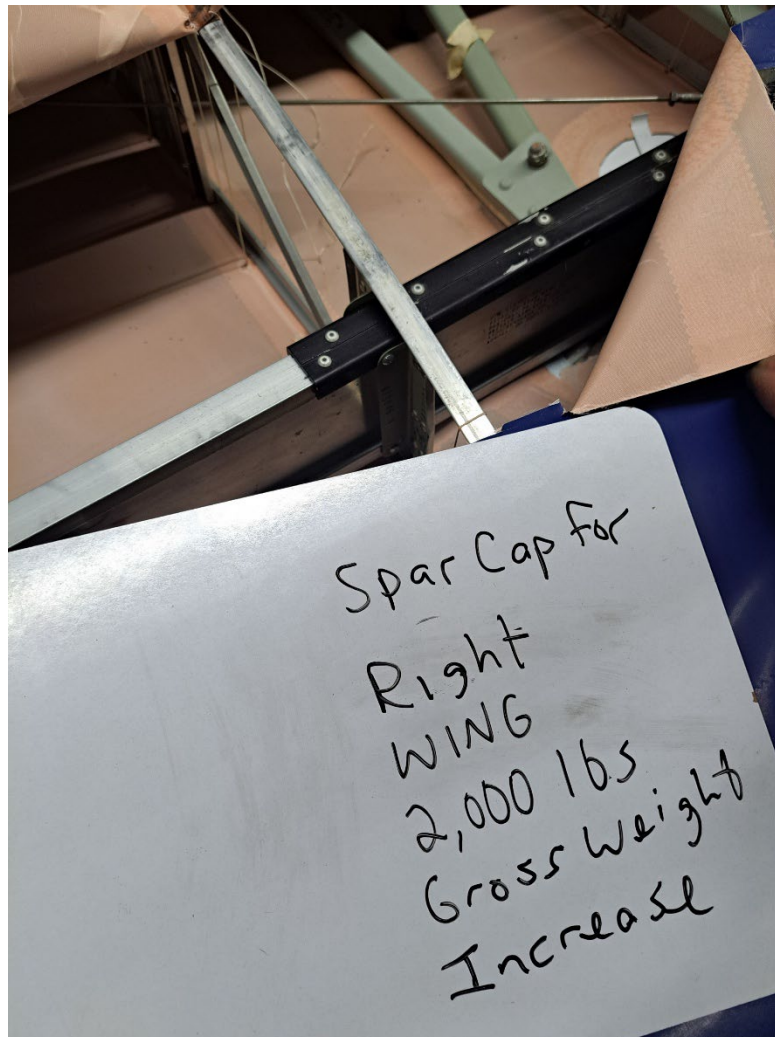


Figure 9 Right wing spar cap for gross weight increase

On the right wing the Airframes Alaska, LLC FAA PMA double slotted flap Part number PSTOL-0001 was in the retracted position and the flap control cable was separated at the wing root area. Cable continuity was confirmed, except for this separation, and the flap was operated by moving the cable. During operation, the flap contacted the aileron inboard edge and the wing mounted gun case. The flap remained attached to the wing at both hinges. The flap was impact damaged.



Figure 10 Right wing PSTOL flap data tag

The right aileron was attached to the wing at both hinges. The stops were intact and unremarkable. The aileron was impact damaged and bent upward approximately midspan. Control cable continuity was confirmed to both the drive and balance cables at the wing root area. The aileron was operated by moving the cables.

Attachment points for previously installed leading edge slats were present on both the left and right wing (Figure 11). There are 6 points of attachment along each wing. The fabric on the wing was found to be slightly faded when compared to the fabric along the leading edge of each wing.



Figure 11 Leading edge slat attachment points

2.4 Landing Gear

The main landing gear were modified Acme Aero strut-type landing gear. The right landing gear was impact damaged and buckled under the fuselage. No damage was observed at the left main landing gear assembly. The airplane had 35" Alaska Bushwheels installed and they remained attached and inflated.

2.5 Cockpit

The instrument panel was impact damaged and broken. The mixture and carburetor heat controls on the instrument panel were jammed and not operable. Continuity to the carburetor heat valve was confirmed. Continuity of the mixture control cable was confirmed to the fractured attachment on the carburetor. The primer control was in and locked. The Electronics International OPT-1 Oil pressure and Temp instrument and an R-1 RPM Tachometer Instrument were removed for further examination.

The control stick was cut by recovery personnel just above the attachment hardware. Correct attachment of the control stick to the base was confirmed. The control stick was a modified with a pistol grip handle.

The pilot's seat belts were modified - the lap belt attached to floor attachments and a shoulder harness with an inertia reel was added. The seat belt was cut by

recovery personnel. The pilot and passenger seat belt latches were operated and functioned correctly. The aircraft was equipped with an aftermarket lithium battery that was installed under the pilot's seat. There was an added bracket at the frame near the passenger seat area consistent with an increased gross weight modification.

2.6 Fuel/Fuel System

The fuel selector valve was observed to be in the both position. The fuel lines to the valve were separated by impact and recovery in multiple locations. The lines were disconnected at the fuel selector valve and the valve was cycled through each position with low pressure air passed through the valve. The valve operated correctly with a tactile detent present at each position.

The gascolator was disassembled, no fuel was present and a small amount of debris was observed on the screen (Figure 12).



Figure 12 Gascolator screen

3.0 Engine Examination

A Lycoming O-360-C2A engine, serial number L-12478-36A a four-cylinder, air cooled, direct drive, horizontally opposed, normally aspirated (carburetor), internal combustion engine was installed (Figure 13, 14). The engine remained attached to the airframe and was in good condition. The engine had sustained extensive impact damage to the underside and was pressed against the firewall. The engine cowling was cut from the airframe. Thumb compression was confirmed on all 4 cylinders.



Figure 13 Accident airplane engine

The spark plugs were secure at each position with their respective spark plug leads attached. The 4 top fine wire spark plugs were removed and were observed to have normal wear when compared to the Champion Check-A-Plug chart (Figure 15). The ignition system was tested by rotating the magnetos with the propeller hub and observing sparks at the respective top spark plug lead terminals. All but cylinder No. 3 exhibited good spark. Cylinder No. 3 top spark plug ignition lead was observed to have been impact separated near the magneto.



Figure 14 Engine data tag

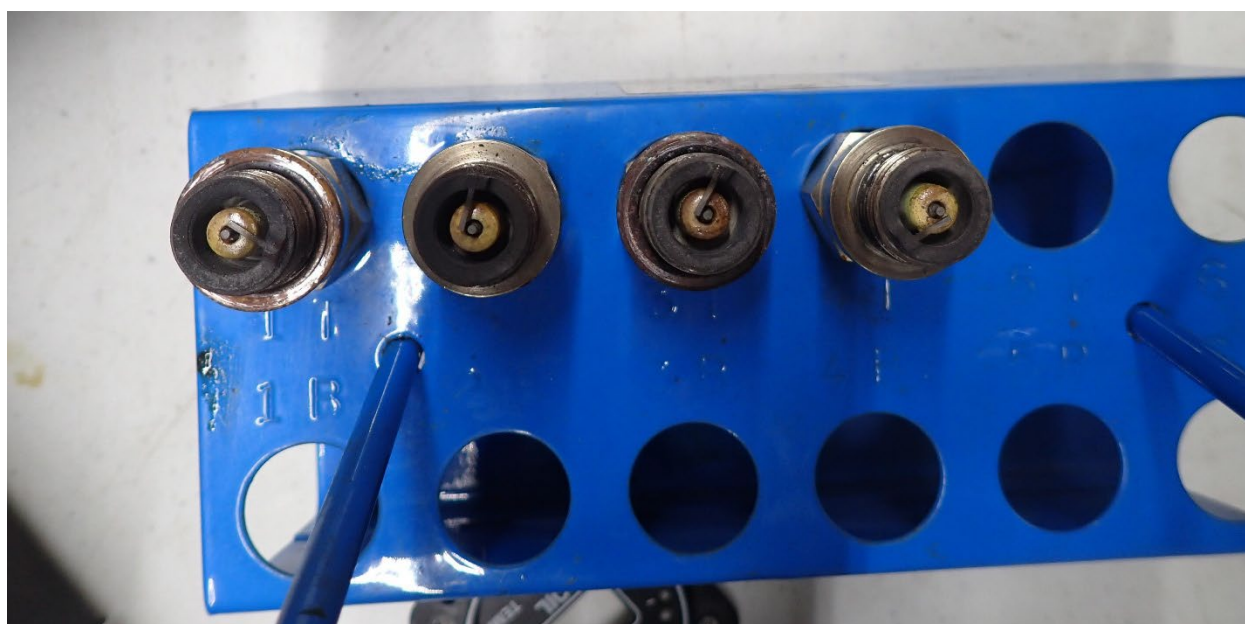


Figure 15 Top 4 spark plugs

The crankshaft was free and easy to rotate in both directions and the fly wheel exhibited rotational scoring. The complete valve train was observed to operate and appeared to be free of any pre-mishap mechanical malfunction. Valve covers were removed, and the crankshaft was rotated at the propeller hub, valve movement was observed to be smooth and symmetrical. Normal "lift action" was observed at each rocker assembly.

The magnetos remained securely clamped at their respective mounting pads. Impulse coupling was confirmed on both magnetos during the rotation of the crankshaft at the propeller hub. The ignition harnesses were securely attached to the magnetos, except for cylinder No. 3, the ignition lead was impact separated near the magneto.

The Marvel Schebler carburetor was impact separated from the engine, as were the throttle and mixture controls (Figure 16).



Figure 16 Carburetor

4.0 Propeller Examination

The propeller was an aftermarket Sensenich ground adjustable STOL propeller. The propeller blades are carbon fiber and have an internal foam core. The

propeller hub remained attached to the crankshaft; however, both propeller blades separated at the hub due to impact (Figure 17). Both blades of the propeller were fractured near the root with a small section of the propeller blades remaining in the hub assembly. One piece of the propeller was found buried at the accident site and was fractured about 30 inches from the root (Figure 18). A small section of a propeller tip section was found, but it could not be determined which propeller blade this piece came from.



Figure 17 Propeller hub



Figure 18 Propeller blade

The other propeller blade was left at the accident site where it was used in the construction of a memorial. The witness reported that this propeller blade was found approximately 100 yards west of the wreckage. A photo of this memorial shows the propeller blade fractured at the root with a section missing at the tip of the blade (Figure 19).



Figure 19 Propeller blade memorial

5.0 Pilot Information

The pilot was a 58 year old male with a commercial pilot with ASEL, AMEL privileges and was an A&P mechanic who also held an IA certificate. The pilot reported civil flight experience that included 4269 total hours and 213 hours in the last six months as of his last medical exam dated 8/29/2022. The pilot held a second class medical certificate.

6.0 Meteorological Information

The closest weather reporting was 69 miles north of the accident site at an elevation of 343 feet. The airport had an ASOS which broadcast locally line of site on 135.65 VHF and was augmented by McGrath FSS personnel on the field. The raw

observations in standard code and abbreviations with time referenced to UTC were as follows:

VFR METAR PAMC 311653Z 32004KT 10SM CLR 08/06 A2973 RMK AO2 SLP072 T00780061 \$=

VFR METAR PAMC 311753Z 36005KT 10SM CLR 10/07 A2973 RMK AO2 SLP071 T01000072 10100 20050 50000\$

Accident 1800Z

VFR METAR PAMC 311853Z 00000KT 10SM CLR 13/08 A2973 RMK AO2 SLP072 T01280083 \$=

VFR METAR PAMC 311953Z 05009KT 10SM CLR 14/08 A2973 RMK AO2 SLP070 T01440083 \$=

Submitted by:

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