Aviation Investigation Final Report

Location:	Nikolai, Alaska	**Accident Number:**	ANC13FA091
Date & Time:	August 30, 2013, 20:24 Local	**Registration:**	N4581A
Aircraft:	Piper PA-18A	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Before departure, caribou antlers were attached externally to the airplane's left wing lift struts, the airplane's main wing fuel tanks were refueled, the airplane was loaded with two butchered caribou and hunting gear, and the passenger's rifle was strapped onto the right wing. The passenger reported that, after taking off toward the east, the pilot stated that he "should have taken off the other way." A witness stated that the airplane departed downwind and began a shallow climb, followed by a gradual left turn, before descending into the trees just beyond the departure end of the runway.

No restricted airworthiness certificate had been issued by the Federal Aviation Administration authorizing external load operations. Further, the airplane's estimated gross weight at the time of the accident was about 642 pounds over its approved maximum takeoff weight and its center of gravity was significantly beyond the aft-most limit. A postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. It is likely that the pilot took off downwind and inadvertently stalled the airplane at a low altitude due to the exceedance of its allowable weight and center of gravity limits and the effect of the external load (antlers) and was unable to recover.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's improper decision to load the airplane beyond its allowable takeoff weight and center of gravity limits, which resulted in a loss of control during the initial climb. Contributing to the accident was the external load and the downwind takeoff.

Findings

Personnel issues	Weight/balance calculations - Pilot
Personnel issues	Decision making/judgment - Pilot
Aircraft	Maximum weight - Capability exceeded
Environmental issues	Tailwind - Effect on equipment
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Takeoff	Loss of control in flight (Defining event)
Initial climb	Aerodynamic stall/spin
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On August 30, 2013, about 2024 Alaska daylight time, a tundra tire-equipped Piper PA-18A (Super Cub) airplane, N4581A, was destroyed by impact and a postimpact fire when it collided with tree-covered terrain just after takeoff from the Tatitna Airport, about 51 miles southeast of Nikolai, Alaska. The private pilot was fatally injured and the sole passenger sustained serious injuries. The airplane was registered to, and operated by the pilot as a visual flight rules (VFR) personal cross-country flight under the provisions of 14 Code of Federal Regulations Part 91. Visual meteorological conditions prevailed, and no flight plan was filed. The flight departed the Tatitna Airport about 2020, and was destined for the Big Lake Airport, Big Lake, Alaska.

According to family members, the flight was returning to Big Lake, the pilot's home airport, following a successful caribou hunt. On the day of the accident, the pilot had completed multiple trips, shuttling the passengers, caribou meat, and hunting gear from a remote hunting location to the Tatitna Airport.

During a telephone conversation with the NTSB IIC on September 5, 2013, the passenger stated that after refueling the main wing fuel tanks and loading the airplane with two butchered caribou and other hunting gear, they taxied to the end of the runway and departed the Tatitna Airport to the east. Once above the treetops they initiated a left turn, when he heard the pilot start to swear and say "I should have taken off the other way". Realizing they were going to crash, he shut his eyes and put his hands up to protect his face. He had no recollection of the accident sequence.

At the time of the accident, a witness standing on the west end of the airport reported good visibility, but said it was "a little windy." He said that as he watched the airplane takeoff from the 1,200 foot long gravel runway, it began a shallow climb, followed by a gradual left turn before descending into the trees just beyond the departure end of the runway.

During a telephone conversation with the NTSB IIC on September 11, 2013, a witness who arrived at the Tatitna Airport at approximately 1700 the day of the accident stated that he observed the accident airplane depart multiple times to the east with a tailwind. At the time of the accident he was inside a cabin near the airport when he heard gunfire, he walked out of the cabin and observed that the wind was still out of the east and noted that the accident airplane had departed with a tailwind.

Pilot Information

Certificate:	Private	**Age:**	58
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	May 10, 2011
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	2000 hours (Total, all aircraft)		

The pilot, age 58, held a private pilot certificate with an airplane single-engine land rating. His most recent third-class medical was issued on May 10, 2011, with the limitation that he must wear corrective lenses.

No personal flight records were located for the pilot, and the aeronautical experience listed on page 3 of this report was obtained from a review of the airmen Federal Aviation Administration (FAA) records on file in the Airman and Medical Records Center located in Oklahoma City. On the pilot's application for medical certificate, dated May 10, 2011, he indicated that his total aeronautical experience was about 2,000 hours, of which 60 were in the previous 6 months.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N4581A
Model/Series:	PA-18A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	18-4887
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:		**Engine Manufacturer:**	LYCOMING
ELT:	Installed	**Engine Model/Series:**	O-320 SERIES
Registered Owner:		**Rated Power:**	150 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

The airplane was a 1956 model year, Piper PA-18A Super Cub Airplane.

The airplane was equipped with a Lycoming O-320-A2B Engine, rated at 150 horsepower at 2700 RPM.

No airframe or engine logbooks were discovered for examination.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PAFK,1052 ft msl	**Distance from Accident Site:**	22 Nautical Miles
Observation Time:	18:53 Local	**Direction from Accident Site:**	335°
Lowest Cloud Condition:	Clear	**Visibility**	15 miles
Lowest Ceiling:	Overcast / 4000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.02 inches Hg	**Temperature/Dew Point:**	14°C / 8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Tatitna, AK (8KA)	**Type of Flight Plan Filed:**	None
Destination:	Big Lake, AK (BGQ)	**Type of Clearance:**	None
Departure Time:	20:18 Local	**Type of Airspace:**	Class G

The closest weather reporting facility is the Farewell Lake Seaplane Base, about 22 miles northwest of the accident site. At 1853, an Aviation Routine Weather Report (METAR) was reporting, in part: Wind, calm; visibility, 15 statute miles; clouds and sky condition, overcast at 4,000 feet; temperature, 57 degrees; dew point, 46 degrees; altimeter, 30.02 inches.

The FAA maintained weather cameras at Rohn, near the west end of the Tatitna airport. The Rohn camera recorded images to the northwest, east, and south. The midpoint for the field-of-view arc for the northwest camera was 336 degrees (true), east was 085 degrees, and 192 degrees for the south camera; the site elevation was 1,403 feet msl.

A reference picture for the south camera noted a peak at 2,850 feet mean sea level at 3.5 statute miles, and a peak at 4,800 mean sea level at 11.0 statute miles. A review of the images recorded about the time of the accident indicated high ceilings and unrestricted visibilities. At 20:27:06, approximately 3 minutes after the accident, the east camera captured smoke traveling in an easterly direction.

Airport Information

Airport:	Tatitna 8KA	**Runway Surface Type:**	Gravel
Airport Elevation:	1490 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	06	**IFR Approach:**	None
Runway Length/Width:	1200 ft / 12 ft	**VFR Approach/Landing:**	None

The Tatitna Airport, also known as Rohn, is a public airport in Class "Golf" airspace, located 51 miles northwest of Nikolai, Alaska, at an estimated elevation of 1490 feet. At the time of the accident, the airport had one gravel surface runway (6/24) that was 1200 feet long

by 12 feet wide.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Serious	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	1 Fatal, 1 Serious	**Latitude, Longitude:**	62.292499,-152.353332(est)

Continuous poor weather conditions in the area prevented the National Transportation Safety Board (NTSB) investigator-in-charge (IIC) from reaching the accident site until the afternoon of September 4.

The on-scene examination revealed that the airplane impacted in a near vertical attitude, in an area of sparsely populated spruce trees, approximately ½-mile northeast of the Tatitna Airport, at an elevation of about 1,450 feet mean sea level. The nose of the airplane was on approximately a 205 degree heading (All headings/ bearings noted in this report are magnetic).

An unspecified amount of meat and hunting gear was discovered amongst the incinerated wreckage, a set of caribou antlers was found between the left wing lift struts, and a rifle attached to the right wing lift struts.

An area believed to be the initial impact point was marked by a cut treetop, atop a 40 foot tall spruce tree. The distance between the initial impact point and the main wreckage site was about 72 feet.

Numerous cut branches were strewn from the initial impact point to the accident site, and on both the left and right side of the wreckage forward of the engine. Examination of these cut tree limbs revealed flat angular fractures with black paint transfer marks.

All of the airplanes major components were found at the main wreckage site.

Both wing fuel tanks were ruptured and partially consumed by fire. The inboard portion of both wings and the cockpit and cabin area, were incinerated by the postaccident fire.

Although burned, both wing lift struts remained attached to their respective wing and fuselage attach points.

The remaining aft portion of the tail assembly and empennage remained attached to the fuselage. The vertical stabilizer, elevator, and the rudder sustained fire damage, but remained attached to their respective attach points.

All the primary flight control surfaces remained connected to their respective attach points, and flight

control continuity was verified from all of the primary flight control surfaces to the cockpit.

The engine sustained fire and impact damage. Both propeller blades remained attached to the engine crankshaft. One propeller blade exhibited extensive leading edge gouges, substantial torsional "S" twisting and chordwise scratching. The other propeller blade exhibited aft bending approximately eight inches from tip. The examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

Additional Information

Estimated Weight and Balance

Due to the extensive fire damage, an exact weight and balance calculation could not me made. However, enough information was available for the IIC to make a conservative estimation of the airplane's weight at the time of the accident.

The pilot's weight was taken from his most current FAA medical examination. The weight of the rear seat passenger was reported during a telephone conversation with the IIC.

The Alaska Department of Fish and Game, 2013 – 2014 Alaska Hunting Regulations lists approximate weights of big game species, a Caribou carcass is estimated at 300 pounds. A Caribou carcass is defined as the weight following the removal of the viscera, head, hide, and lower legs. The rear seat passenger estimated the total weight of the Caribou meat to be 500 pounds (500 pounds was used for the weight and balance calculation).

During a conversation with the IIC, the passenger said that the airplane's wing fuel tanks were completely filled previous to the accident flight from fuel jugs that had been flown in, and stored at the Tatitna Airport.

No airframe or engine logbooks were discovered for examination, but the FAA maintains an electronic database that contains airworthiness documents for registered airplanes. The last documented official weight and balance information located in the FAA airworthiness database, for the accident airplane, was dated October 16, 1964. At that time, the basic empty weight of the airplane was 1,101 pounds, with a center of gravity of positive 13.9 inches.

The NTSB IIC computed an updated basic empty weight and center of gravity based on documentation contained in the FAA airworthiness database that included equipment that had been added and removed from the accident airplane since October 16, 1964. The updated basic empty weight of the airplane was estimated at 1,188.25 pounds, with a center of gravity of positive 13.82 inches.

Estimated weights

Basic Empty Weight (computed by NTSB IIC) – 1,188.25 pounds

Pilot– 250 pounds

Rear Seat Passenger – 200 pounds

Caribou meat – 500 pounds

Caribou antlers – 15 pounds

Rifle – 8 pounds

Fuel (36 gallons) – 216 pounds

Oil (8 quarts) – 15 pounds

The gross weight of the airplane at the time of the accident was conservatively estimated to be 2,392.25 pounds, or 642.25 pounds over the approved maximum takeoff gross weight for the airplane. The estimated center of gravity at the time of the accident was positive 25.07 inches. The center of gravity range at 1,750 pounds (maximum gross weight) is positive 14.0 inches to positive 20.0 inches.

External Load

The FAA has established policy that allows external loads to be carried on fixed wing aircraft within the State of Alaska. The procedure has been established as a valid "special purpose" under 14 CFR, Part 21.25. These operations are authorized in the restricted category only and airplanes used for these operations must be issued a multiple airworthiness certificate. In addition, no person may be carried on board the airplane, when the airplane is operated in the restricted category, unless the person is a flight crewmember, flight crewmember trainee, or performs an essential function in connection with the external load.

No record was found in the FAA electronic airworthiness documents database that indicated a multiple airworthiness certificate, authorizing eternal load operations, had been issued for the accident airplane.

The FAA has developed a list of suggestions when carrying external loads on fixed wing airplanes, the suggestions state in part: It has been reported that on some aircraft, antlers secured to the wing struts can cause a significant air flow disturbance to the tail surfaces.

Medical and Pathological Information

A post mortem examination was conducted under the authority of the Alaska State Medical Examiner, Anchorage, Alaska, on September 3, 2013. The cause of death for the pilot was attributed to severe thermal injury.

The Federal Aviation Administration (FAA) Civil Aeromedical Institute performed toxicology examinations for the pilot on September 26, 2013, which was negative for alcohol and drugs.

Administrative Information

Investigator In Charge (IIC):	Banning, David
Additional Participating Persons:	Christina Bryant; Federal Aviation Administration; Anchorage, AK
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Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=87943