National Transportation Safety Board
Aviation Accident Final Report

Location:	McGrath, AK	**Accident Number:**	ANC04LA052
Date & Time:	05/07/2004, 2130 AKD	**Registration:**	N44911
Aircraft:	Douglas C-54B	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General Aviation - Positioning		

Analysis

The crew of the 4 engine airplane started its engines for a positioning flight from a remote mining airstrip. Following the startup of the engines, an explosion occurred in the left wing area aft of the number 1 engine firewall and number 1 auxiliary fuel tank. The airplane was parked next to the mine's fuel storage tank, and the pilot added power on the remaining engines to move away from the storage tank. Within seconds of beginning to move, the number 1 engine fell off the burning wing, followed by separation and aft folding of the outboard end of the left wing. The outboard end of the wing, however, was still attached via control cables. The pilot taxied the airplane about 200 feet, dragging the partially burning left wing segment to a pond of water and shut down the remaining engines. The crew evacuated with no injuries. Water was applied to the airplane until the fire was extinguished, about 3 1/2 hours later. NTSB and FAA personnel did not travel to the scene, and the airplane was not recovered from the mining strip. The airplane's left wing powerplant and fuel system consists of the number 1 and 2 engines. Each engine is separated from the wing by a firewall. Within the wing, from outboard to inboard, the fuel tank system consists of the number 1 fuel tank, the left wing auxiliary fuel tank, and the number 2 fuel tank. Each wet-wing type fuel tank contains a submerged electrical boost pump, sump drain valves and fuel quantity transmitters. The fuel system has selector valves, crossfeed valves, and shut-off valves for each tank. An FAA inspector examined portions of the airplane that the operator supplied. The inspector examined a portion of the upper wing surface that had been blown away from the airplane during the initial explosion. He noted that the inside of the upper wing surface, normally positioned over the auxiliary tank, was not charred or sooted. A separated portion of the lower wing surface, near the auxiliary boost pump, was sooted and charred. The aft side of the number 1 engine firewall was not charred. A portion of the number 1 engine nacelle was oily, but not sooted or charred. The operator located the auxiliary in-tank boost pump and sent it to the FAA. The boost pump impeller, encased in a small wire cage, was not melted and could be turned by hand. The body of the pump was sooted but not thermally damaged. Its wire connectors and one fuel line were melted. A smaller line, what appeared to be a return line, was not melted.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A fuel tank explosion in the left wing auxiliary fuel tank, and subsequent fuel fire that occurred during engine start for an undetermined reason.

Findings

Occurrence #1: EXPLOSION
Phase of Operation: STANDING - STARTING ENGINE(S)

Findings
1. FUEL SYSTEM,TANK - EXPLODED
2. (C) REASON FOR OCCURRENCE UNDETERMINED
3. FLUID,FUEL - FIRE

Factual Information

On May 7, 2004, about 2130 Alaska daylight time, a Douglas C-54B airplane, N44911, sustained substantial damage when an explosion and fire occurred in the left wing during engine start at the Ganes Creek Mine airstrip, about 25 miles west of McGrath, Alaska. The airplane was being operated as a visual flight rules (VFR) positioning flight under Title 14, CFR Part 91, when the accident occurred. The airplane was operated by Brooks Fuel Inc., Fairbanks, Alaska. The captain and first officer, both airline transport certificated pilots, were not injured. Visual meteorological conditions prevailed, and VFR company flight following procedures were in effect. The intended destination was Fairbanks.

During a telephone conversation with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), on May 8, the vice president of Brooks Fuel Inc., reported that the crew was beginning engine start procedures and successfully started engines number 4, 3, 2, and 1 in succession. Following the startup of the number 1 engine, an explosion occurred in the left wing area between engines 1 and 2. The crew shutdown engine 1, and applied engine power in the remaining engines and taxied away from the area of the explosion. Fire continued to burn in the wing area. Engine 1 and the remaining outboard section of the left wing separated from the rest of the wing. The crew then stopped about mid-field and disembarked the airplane.

In the Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1), submitted by the operator, the crew of the airplane reported that seconds after the number 1 engine start was complete, an explosion occurred in the area aft of the number 1 engine firewall and number 1 auxiliary fuel tank. The left wing auxiliary fuel tank is not normally used. The aircraft was parked next to the mine's fuel storage tank, and pilot added power on the remaining engines to move away from the storage tank. Within seconds of beginning to move, the number 1 engine, including its firewall, fell off the burning wing, followed by separation and aft folding of the outboard end of the left wing. The outboard end of the wing, however, was still attached via control cables. The pilot taxied the airplane about 200 feet, dragging the partially burning left wing segment to a pond of water and shut down the remaining engines. The crew evacuated with no injuries.

The mine owner responded to the scene with a bulldozer and gasoline powered water pump. The airplane was pushed another 200 feet down the runway by the dozer to an area of more water. Water was applied to the aircraft until the fire was extinguished, about 0100.

NTSB and Fairbanks FSDO personnel did not travel to the scene, and the airplane was not recovered from the mining strip.

The airplane's left wing powerplant and fuel system consists of the number 1 and 2 engines. Each engine is separated from the wing by a firewall. Within the wing, from outboard to inboard, the fuel tank system consists of the number 1 fuel tank, the left wing auxiliary fuel tank, and the number 2 fuel tank. Each wet-wing type fuel tank contains a submerged electrical boost pump, sump drain valves, and fuel quantity transmitters. The fuel system has selector valves, crossfeed valves, and shut-off valves for each tank.

An FAA inspector examined portions of the airplane that the operator brought into Fairbanks. The inspector examined a portion of the upper wing surface that had been blown away from the airplane during the initial explosion. He noted that the inside of the upper wing surface,

normally positioned over the auxiliary tank, was not charred or sooted. A separated portion of the lower wing surface, near the auxiliary boost pump, was sooted and charred. The aft side of the number 1 engine firewall was not charred. A portion of the number 1 engine nacelle was oily, but not sooted or charred. The operator located the auxiliary in-tank boost pump and sent it to the FAA. The boost pump impeller, encased in a small wire cage, was not melted and could be turned by hand. The body of the pump was sooted but not thermally damaged. Its wire connectors and one fuel line were melted. A smaller line, what appeared to be a return line, was not melted.

The FAA inspector tested the number 1 engine auxiliary boost pump switch by moving the switch through its on/off stroke, and reported: "The #1 Aux Pump control switch action is rough. Performing a continuity check on the switch revealed the switch would close part-way through the stroke and open when the action reached the full stroke."

Pilot Information

Certificate:	Airline Transport; Commercial	**Age:**	40, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	05/05/2004
Occupational Pilot:		**Last Flight Review or Equivalent:**	02/01/2004
Flight Time:	11250 hours (Total, all aircraft), 5630 hours (Total, this make and model)		

Co-Pilot Information

Certificate:	Airline Transport; Commercial	**Age:**	59, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	07/23/2003
Occupational Pilot:		**Last Flight Review or Equivalent:**	11/11/2003
Flight Time:	7465 hours (Total, all aircraft), 1560 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Douglas	**Registration:**	N44911
Model/Series:	C-54B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Transport	**Serial Number:**	10461
Landing Gear Type:	Retractable - Tricycle	**Seats:**	2
Date/Type of Last Inspection:	04/16/2004, AAIP	**Certified Max Gross Wt.:**	66670 lbs
Time Since Last Inspection:	66 Hours	**Engines:**	4 Reciprocating
Airframe Total Time:	29667 Hours as of last inspection	**Engine Manufacturer:**	Pratt & Whitney
ELT:	Installed, not activated	**Engine Model/Series:**	R-2000
Registered Owner:	Brooks Fuel Inc.	**Rated Power:**	1450 hp
Operator:	Brooks Fuel Inc.	**Operating Certificate(s) Held:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	PAMC, 337 ft msl	**Distance from Accident Site:**	25 Nautical Miles
Observation Time:	2153 ADT	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Few / 4500 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	Broken / 18000 ft agl	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.76 inches Hg	**Temperature/Dew Point:**	20°C / 4°C
Precipitation and Obscuration:			
Departure Point:	McGrath, AK	**Type of Flight Plan Filed:**	Company VFR
Destination:	Fairbanks, AK (PAFA)	**Type of Clearance:**	None
Departure Time:	ADT	**Type of Airspace:**	Class G

Airport Information

Airport:	Ganes Creek	**Runway Surface Type:**	
Airport Elevation:	800 ft	**Runway Surface Condition:**	
Runway Used:	NA	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-Ground
Total Injuries:	2 None	**Latitude, Longitude:**	63.007222, -156.512222

Administrative Information

Investigator In Charge (IIC):	Scott Erickson	**Report Date:**	10/28/2004
Additional Participating Persons:	Joseph Walsh; FAA-AL-FAI FSDO 01; Fairbanks, AK		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		