Aviation Investigation Final Report

Location:	WILLISTON, North Dakota	**Accident Number:**	CHI95LA225
Date & Time:	July 16, 1995, 08:14 Local	**Registration:**	N29000
Aircraft:	CESSNA 206	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	5 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported that he noticed an engine vibration about 10 minutes after takeoff, and returned to Williston to make a precautionary landing. While approaching the downwind leg for runway 29 the engine seized. He was unable to make a runway landing so he attempted to land on the airport property. He saw hay bales and equipment where he intended to land, and manuevered to avoid the bales. The airplane stalled in a near level attitude, impacting the runway berm. Examination of the engine revealed that the fuel system was running rich at low power settings, but lean at high power settings. The fuel pump was delivering 22 psi of fuel pressure instead of the 34 psi specified. The examination of the number four piston revealed that it was severely eroded around the perimeter of the piston, typical of combustion chamber detonation.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: engine failure due to low fuel pressure at high power settings and subsequent detonation. A factor was an evasive maneuver to avoid obstacles which precipitated a stall. Additional factors include the hay bales, farm equipment, and the runway berm.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: CLIMB - TO CRUISE

Findings
1. (C) FUEL SYSTEM,PUMP - PRESSURE TOO LOW
2. (C) ENGINE ASSEMBLY,PISTON - FAILURE

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
3. (F) TERRAIN CONDITION - CROP
4. (F) OBJECT - VEHICLE
5. (F) MANEUVER TO AVOID OBSTRUCTIONS - PERFORMED - PILOT IN COMMAND
6. (F) STALL - INTENTIONAL - PILOT IN COMMAND
7. TERRAIN CONDITION - BERM

Factual Information

On July 16, 1995, at 0814 central daylight time, a Cessna 206, N29000, sustained substantial damage during a forced landing due to loss of engine power near Williston, North Dakota. The commercial pilot reported no injury to himself or to the four passengers. The 14 CFR Part 91 flight departed Sloulin International Airport, Williston, North Dakota, en route to Lethbridge, Alberta, Canada. Visual meteorological conditions prevailed and an instrument flight plan was filed.

The pilot reported that he had recently purchased the airplane and had flown about 17 hours in the airplane prior to the accident flight. He reported that the engine appeared to run smoothly and develop approximately normal power considering the temperatures and humidity.

The pilot reported that on July 16, 1995, he departed runway 29, Sloulin International Airport, Williston, North Dakota, at about 0802. He reported that at about four miles from the airport he noticed a very slight engine vibration. He reported that he changed fuel tanks, turned the fuel pump on and off, moved the mixture both richer and leaner, changed the manifold pressure and RPM, and checked the magnetos, but nothing seemed to change the vibration. At about 6 to 8 miles from the airport, he decided to return to the airport. He reported that he monitored the fuel flow, cylinder head temperature (CHT), exhaust gas temperture (EGT), oil pressure, oil temperature, manifold pressure, RPM, and all indications appeared normal.

The pilot reported that the vibration continued the same until he was about 1 1/2 miles from the runway, approaching a left downwind to runway 29 when the engine seized. He realized he could not make either runway 29 or 02, and he elected to try to make the airport property. He reported that when he cleared the airport fence, he saw that his intended area of landing was obstructed with round haybales and haybaling equipment. He reported that he added flaps and turned in order to clear the machinery. He reported that the airplane landed in a nearly level, full stall condition. The airplane hit hard on the upslope of the runway causing the aircraft's belly to scrape solidly with the ground. The airplane bounced again before rolling up on the runway and coming to a stop.

After the accident the pilot checked the oil and the dipstick indicated that there was no oil. He reported that prior to the accident, the airplane had used only one quart of oil in about the last 17 hours of flight.

An Airworthiness Inspector from the Federal Aviation Administration inspected the aircraft and reported that the number four piston had melted down, and a hole had burned through the piston near the rings. He reported that the melted aluminum had blown into the exhaust system and into the muffler. He reported that the CHT probe measured the temperatures from the number three cylinder, and that the EGT probe measured temperatures from the left

exhaust manifold. He also reported that fuel samples were taken and showed no signs of contamination.

An engine teardown was performed for further examination. The examination revealed that the number 1, 2, 3, 5, and 6 cylinders had corrosion on the cylinder walls. All the exhaust valves were redish orange in color. The number four piston was damaged by the breakdown of the metal and had contaminated the cylinder. The examination revealed that the engine had seized and that the transfer collar had seized on the crankshaft. The magnetos were checked and they operated normally.

The fuel pump was bench tested and the examination revealed that the pump was running rich at low power settings, but lean at high power settings. At 2600 RPM the fuel pump was delivering 22 pounds per inch (psi) pressure vice the 32 psi called for in the specifications. The fuel nozzles flow tested within specifications. The fuel pump was torn down for further examination and it revealed that the pump vanes were slightly loose, but no major defect was noted.

The number four piston and cylinder were sent to the Materials Laboratory of the National Transportation Safety Board for examination. The Materials Laboratory reported that the head of the number #4 piston was severely eroded around the perimeter from the combustion chamber surface to the insert for the first compression ring. The report stated that the erosion appeared typical of combustion chamber detonation.

Pilot Information

Certificate:	Airline transport	**Age:**	55,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	July 1, 1995
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	15000 hours (Total, all aircraft), 500 hours (Total, this make and model), 14800 hours (Pilot In Command, all aircraft), 100 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 10 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	**Registration:**	N29000
Model/Series:	206 206	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal; Utility	**Serial Number:**	206-1000
Landing Gear Type:	Tricycle	**Seats:**	6
Date/Type of Last Inspection:	April 2, 1995 Annual	**Certified Max Gross Wt.:**	3500 lbs
Time Since Last Inspection:	103 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	5507 Hrs	**Engine Manufacturer:**	CONTINENTAL
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-520-CDF
Registered Owner:	JOHN C. HARDER	**Rated Power:**	300 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ISN ,1982 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	07:53 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Scattered / 5500 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 9000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	16°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(ISN)	**Type of Flight Plan Filed:**	IFR
Destination:	(YQL)	**Type of Clearance:**	IFR
Departure Time:	08:02 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	SLOULIN FIELD ISN	**Runway Surface Type:**	
Airport Elevation:	1982 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	4 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	5 None	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	Silliman, James
Additional Participating Persons:	JOHN KLINE; FARGO , ND HENRY AUNG; SOUTH BEND , IN JOE SOUZA; FARGO , ND
Original Publish Date:	May 17, 1996
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=9947