



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	SPOKANE, WA	<b>Accident Number:</b>	SEA94FA085
<b>Date &amp; Time:</b>	03/18/1994, 0156 PST	<b>Registration:</b>	N3433Y
<b>Aircraft:</b>	DOUGLAS DC-3C	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>		<b>Injuries:</b>	2 Fatal
<b>Flight Conducted Under:</b>	Part 135: Air Taxi & Commuter - Non-scheduled		

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## Analysis

SHORTLY AFTER TAKEOFF, THE CO-PILOT REPORTED THAT THE FLIGHT WAS RETURNING WITH THE RIGHT ENGINE SHUT DOWN. SECONDS LATER, THE TOWER CONTROLLER SAW A FIRE. THE AIRPLANE COLLIDED WITH LEVEL TERRAIN, 3,450 FEET FROM THE END OF RWY 21 IN A 75 TO 80 DEGREE NOSE DOWN ATTITUDE. THE RIGHT ENGINE PROPELLER WAS FOUND IN THE FEATHERED POSITION. THE LEFT ENGINE INDICATED EVIDENCE THAT IT WAS PRODUCING POWER AT THE TIME OF IMPACT. A FATIGUE CRACK WAS FOUND THAT SEPARATED THE HEAD FROM THE BARREL ON THE NUMBER EIGHT CYLINDER OF THE RIGHT ENGINE. NO OTHER EVIDENCE WAS FOUND TO INDICATE A MECHANICAL FAILURE OR MALFUNCTION.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: THE FAILURE OF THE PILOT-IN-COMMAND TO MAINTAIN AIRSPEED. FACTORS TO THE ACCIDENT WERE: CYLINDER FATIGUE, DARK NIGHT AND STALL ENCOUNTERED.

## Findings

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

### Findings

1. 1 ENGINE
2. (F) ENGINE ASSEMBLY,CYLINDER - FATIGUE

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Occurrence #2: LOSS OF CONTROL - IN FLIGHT  
Phase of Operation: MANEUVERING - TURN TO LANDING AREA (EMERGENCY)

### Findings

3. (F) LIGHT CONDITION - DARK NIGHT
4. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
5. (F) STALL - ENCOUNTERED - PILOT IN COMMAND

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Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER  
Phase of Operation: DESCENT - UNCONTROLLED

### Findings

6. TERRAIN CONDITION - OPEN FIELD

## Factual Information

### HISTORY OF FLIGHT

On March 18, 1994, at 0156 Pacific standard time, a Douglas DC- 3C, N3433Y, operated by Salair Inc., as Flight 2991, collided with the terrain after the pilot reported shutting the right engine down shortly after takeoff from the Spokane Airport, Spokane, Washington. Visual meteorological conditions prevailed at the time and an instrument flight rules flight plan was filed for the cargo flight that was conducted under 14 CFR 135. The airplane was destroyed by a post crash fire and the certificated Airline Transport pilot and commercial pilot were fatally injured. The flight was en route to Portland, Oregon.

The Air Traffic Controller on duty at the tower reported that shortly after the airplane took off on runway 21, the pilot reported that the flight was returning to the airport and that the number two engine was shut down. The controller cleared the flight to any runway and asked if they required emergency equipment. The flight crew did not respond.

### PERSONNEL INFORMATION

The airline transport certificated Captain had accumulated approximately 3,877 hours of total flight time in all aircraft and 3,114 hours in the Douglas DC-3. A representative from Salair reported that the Captain had been employed with the company since January 17, 1990. On the day of the accident, it was reported that the pilot had been on-duty for one hour and fifty-five minutes. The day before the accident, the pilot had been on-duty for ten hours, with four hours and twenty minutes of flight time. Fourteen hours of rest period were recorded from the days previous flight.

The commercially certificated co-pilot had accumulated approximately 1,050 hours of total flight time in all aircraft and 530 hours in the Douglas DC-3. The co-pilot had been employed with Salair since February 25, 1994. On the day of the accident, the co-pilot had been on-duty one hour and fifty-five minutes. The day before the accident, the co-pilot had been on- duty for eleven hours, with four hours and twenty minutes of flight time. Thirteen hours of rest period were recorded from the days previous flight. The co-pilot's resume indicates that the co-pilot had been employed by Salair in August 1986 to April 1987, as a mechanic on the DC-3.

### AIRCRAFT INFORMATION

On February 21, 1994, the right engine experienced a misfire and loss of power while on final approach. The airplane was grounded for maintenance and the right engine was removed and replaced with an overhauled engine from Precision Airmotive, Everett, Washington. Precision Airmotive reported that the overhaul was completed and approved for service on December 20, 1993 and preserved for short term storage. Prior to the overhaul, Precision Airmotive reported that the engine had been "on the shelf in long term storage." At the time of the accident, the operator reported that the engine had accumulated a total time of 15 hours since the overhaul.

### METEOROLOGICAL INFORMATION

At 0103 hours, a complete preflight weather briefing was obtained from the Spokane Flight Service Station (FSS). The specialist reported the current weather at Spokane was a measured overcast ceiling at 4,000 feet. Visibility was ten miles with light rain. The temperature was 41 degrees, with a dewpoint of 37 degrees. The wind was from 160 degrees at 12 knots, and the altimeter was 29.60" Hg.

At 0157 hours, a weather observation was taken by the FSS and it was reported that the overcast ceiling was at 3,300 feet. Visibility was ten miles with light rain. The temperature was 40 degrees with a dewpoint of 38 degrees. The wind was from 170 degrees at eight knots, and the altimeter was 29.58" Hg.

#### COMMUNICATIONS

At 0148 hours, the Captain made contact with Spokane Tower and reported that the flight's destination was Portland. The controller responded that the flight was cleared to Portland as filed, and the flight was to maintain 10,000 feet.

At 0149 hours, the Captain read the clearance back to the controller and requested takeoff on runway 21 at intersection Foxtrot. The controller instructed the flight to taxi to runway 21.

At 0153 hours, the Captain reported to the controller that the flight was ready for takeoff on runway 21. The controller instructed the flight to, after takeoff, fly a heading of 215 degrees to Portland, and it was cleared for takeoff.

At 0154 hours, the Captain requested a wind check, and the controller responded that the wind was from 160 degrees at 12 knots.

At 0155 hours, the Co-pilot reported to the controller that the flight was returning, and that the number two engine was shut down. The controller responded "runway of your choice, cleared to land, wind 150 degrees at eight knots." The controller then asked if the flight needed equipment, however, there was no response. Seconds later, the controller reported seeing the fire and notified the emergency response team.

NOTE: The re-recorded tower tape was made available to personnel at Salair to identify the flight crews voices. It was noted that all ground communications were made by the Captain. The last transmission was made by the Co-pilot.

#### WRECKAGE AND IMPACT INFORMATION

The airplane collided with the terrain in an open level field located 3,450 feet from the end of runway 21 and 900 feet to the right of runway centerline. The airplane was lying on its belly, with the main landing gear retracted. The nose of the airplane was positioned on a magnetic bearing of 160 degrees. A search of the surrounding area did not indicate evidence of a wreckage distribution path.

The entire fuselage and cargo, cockpit, and inboard section of both wings had been consumed by fire. The empennage was lying on its right side, with the right horizontal stabilizer crushed below the vertical stabilizer that was lying flat on the ground. The left horizontal stabilizer was positioned vertical to the terrain. Both wings remained in place with respect to the fuselage. The left wing displayed rearward crushing along the entire length of the leading edge. The right wing leading edge was undamaged. The wing tips were not damaged.

The trailing edge flaps were extended to 10 degrees and remained attached to their respective hinges. The ailerons for both wings were in place and attached. Control continuity was established from the empennage to the forward fuselage, and from both wings to the center of the fuselage. The cockpit was completely destroyed by fire and impact forces.

Both engines were imbedded nose first into the soft soil with the rear of the engines visible. The angle of impact was estimated at 75 to 80 degrees nose down. The tip of one propeller blade to the left engine was visible. The remaining propellers were buried in the ground. The

right engine was buried under a large amount of the burned cargo.

After the engines were removed from the ground, it was found that the propeller from the left engine had separated as a unit from the crankshaft. Two of the propeller blades remained attached to the hub. One of the blades was bent nearly 90 degrees and loose in the hub. The other blade was slightly bent and positioned to a low pitch. The third blade had separated from the hub and was found deep in the hole from which the engine was removed. This blade was also bent, however, less than 90 degrees.

The right propeller had also separated from the crankshaft as a unit and all propeller blades remained attached to the hub. All three blades were straight and positioned to a high pitch or feathered position.

The tachometer gage was found attached to the instrument panel. The gage read 2,800 RPM for the left engine, while the right engine read 300 RPM.

The engines were transported to Day-Air-Inc., Stockton, California, for teardown inspection. It was noted that both engines sustained extensive impact damage and the accessory sections were completely destroyed by fire and impact damage. The lower banks of cylinders on both engines had partially pulled away from the crankcase and the studs were either bent or broken.

Crankshaft rotation was not possible on either engine. The front crankcase to the left engine between cylinders two through four, and ten through 12 was split from impact damage.

The main oil screens were examined from both engines. Both screens were intact and small particles of silver and aluminum were present. Light scoring was noted in the housing of the oil pumps.

All of the cylinders were present and intact except for the number eight cylinder on the right engine. The cylinder head was found separated from the barrel. The connecting rod was bent and the piston head displayed extensive impact damage. The interior of the barrel was scored.

A National Transportation Safety Board metallurgical examination of the cylinder determined that the cylinder head separated as a result of a fatigue crack. The crack originated at the most inboard thread root of the barrel in a suspected area of high stress. The metallurgist reported that no metallurgical anomalies were noted in the barrel. The metallurgist also reported that the separation was a possible result of engine operating stresses or excessive loading.

#### MEDICAL AND PATHOLOGICAL EXAMINATION

An autopsy on both pilots was performed by Dr. G.R. Lindholm, at the Holy Family Hospital, Spokane, Washington. The Pathologist reported that the cause of death to both pilots was from aortic laceration due to blunt impact injury of the chest.

The Washington State Toxicology Laboratory reported that both pilots were negative for blood alcohol and detected less than 5% saturation of blood carbon monoxide. Both pilots tested positive for caffeine.

#### ADDITIONAL DATA/INFORMATION

The airframe was released to the owner on March 24, 1994, and was stored at Dickson Iron and Metal, Spokane, Washington. The engines were released to the owner on April 13, 1994, at Day-Air- Inc., Stockton, California. The number eight cylinder was released to the owner on June 29, 1994, and sent to Salair, Spokane, Washington.

## Pilot Information

<b>Certificate:</b>	Airline Transport; Flight Instructor; Commercial	<b>Age:</b>	31, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	Airplane Single-engine; Instrument Airplane	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 1 Valid Medical--w/ waivers/lim.	<b>Last Medical Exam:</b>	05/13/1993
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	3877 hours (Total, all aircraft), 3114 hours (Total, this make and model), 3116 hours (Pilot In Command, all aircraft), 188 hours (Last 90 days, all aircraft), 36 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	DOUGLAS	<b>Registration:</b>	N3433Y
<b>Model/Series:</b>	DC-3C DC-3C	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	43089
<b>Landing Gear Type:</b>	Retractable - Tailwheel	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	03/10/1994, Continuous Airworthiness	<b>Certified Max Gross Wt.:</b>	26900 lbs
<b>Time Since Last Inspection:</b>	15 Hours	<b>Engines:</b>	2 Reciprocating
<b>Airframe Total Time:</b>	37190 Hours	<b>Engine Manufacturer:</b>	P&W
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	R-1830-92
<b>Registered Owner:</b>	SALAIR INC.	<b>Rated Power:</b>	1200 hp
<b>Operator:</b>	SALAIR INC.	<b>Air Carrier Operating Certificate:</b>	On-demand Air Taxi (135)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	SLIA

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night/Dark
Observation Facility, Elevation:	GEG, 2372 ft msl	Observation Time:	0157 PST
Distance from Accident Site:	1 Nautical Miles	Direction from Accident Site:	60°
Lowest Cloud Condition:	Unknown / 0 ft agl	Temperature/Dew Point:	4° C / 3° C
Lowest Ceiling:	Overcast / 3300 ft agl	Visibility	10 Miles
Wind Speed/Gusts, Direction:	8 knots, 170°	Visibility (RVR):	0 ft
Altimeter Setting:	29 inches Hg	Visibility (RVV):	0 Miles
Precipitation and Obscuration:			
Departure Point:		Type of Flight Plan Filed:	IFR
Destination:	PORTLAND, OR (PDX)	Type of Clearance:	IFR
Departure Time:	0153 PST	Type of Airspace:	Class E

## Airport Information

Airport:	SPOKANE INTL (GEG)	Runway Surface Type:	Asphalt
Airport Elevation:	2372 ft	Runway Surface Condition:	Wet
Runway Used:	21	IFR Approach:	None
Runway Length/Width:	9000 ft / 150 ft	VFR Approach/Landing:	None

## Wreckage and Impact Information

Crew Injuries:	2 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	

## Administrative Information

Investigator In Charge (IIC):	DEBRA J ECKROTE,	Adopted Date:	12/02/1994
Additional Participating Persons:	TEX GASTON; SPOKANE, WA BRUCE SALERNO; SPOKANE, WA AL FRAZIER; EVERETT, WA		
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 <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

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