National Transportation Safety Board
Aviation Accident Final Report

Location:	SAN ANTONIO, TX	**Accident Number:**	FTW94FA082
Date & Time:	02/10/1994, 0713 CST	**Registration:**	N741CA
Aircraft:	CESSNA 421C	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General Aviation - Positioning		

Analysis

SHORTLY AFTER TAKEOFF, THE PILOT REPORTED HE HAD 'A PROBLEM' AND NEEDED TO RETURN IMMEDIATELY. WITNESSES OBSERVED DARK BLACK SMOKE COMING FROM BOTH ENGINES. THE AIRPLANE COLLIDED WITH A TREE 1/2-MILE NORTHEAST OF THE RUNWAY THRESHOLD. ANALYSIS OF FUEL SAMPLES REVEALED THE PRESENCE OF APPROXIMATELY 50% JET FUEL. THE RIGHT PROPELLER WAS FOUND FEATHERED AND ENGINE DISASSEMBLY REVEALED A HOLE BURNED IN THE RIGHT ENGINE NUMBER 5 PISTON. LEFT ENGINE DISASSEMBLY REVEALED PISTON EDGES ERODED DOWN TO THE FIRST COMPRESSION RING. FUEL FILLER RESTRICTORS HAD BEEN INSTALLED IN THE AIRPLANE'S FUEL TANKS, BUT THE FUEL TRUCK DID NOT HAVE THE RESTRICTIVE MATING NOZZLE. THE FUEL TRUCK WAS OWNED BY THE FUEL VENDER AND LEASED TO THE FBO.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: IMPROPER SERVICING OF THE AIRPLANE WITH JET FUEL, WHICH RESULTED IN PREIGNITION AND/OR DETONATION AND SUBSEQUENT FAILURE OF PISTONS IN BOTH ENGINES. A FACTOR RELATED TO THE ACCIDENT WAS: THE LACK OF A RESTRICTIVE MATING NOZZLE ON THE REFUELING TRUCK.

Findings

Occurrence #1: LOSS OF ENGINE POWER
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. 2 ENGINES
2. (C) MAINTENANCE,SERVICE OF AIRCRAFT/EQUIPMENT - IMPROPER - FBO PERSONNEL
3. (F) AIRPORT FACILITIES,REFUELING TRUCK/EQUIPMENT - INADEQUATE
4. (C) FLUID,FUEL GRADE - IMPROPER
5. (C) MISC,ENGINE PRE-IGNITION AND/OR DETONATION
6. ENGINE ASSEMBLY,PISTON - FAILURE,TOTAL
7. PROPELLER FEATHERING - PERFORMED - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: LANDING

Findings
8. OBJECT - TREE(S)

Factual Information

HISTORY OF FLIGHT

On February 10, 1994, at 0713 central standard time, a Cessna 421C, N741CA, was destroyed when it collided with a tree and impacted terrain in San Antonio, Texas. The airline transport rated pilot and one passenger were fatally injured, and another passenger received serious injuries. Visual meteorological conditions prevailed.

A spokesman for the operator said the airplane, operating as an air ambulance, made a round trip to Del Rio, Texas, earlier that morning. That flight originated and returned to San Antonio International Airport. Upon return the pilot instructed the fixed base operator (FBO) to service the airplane with 60 gallons of 100 octane low lead aviation grade gasoline, 30 gallons in each wing tank. According to Federal Aviation Administration (FAA) documents, the pilot obtained a weather briefing, filed an IFR flight plan to Eagle Pass, Texas, then took off on runway 03 at 0711. The airplane and crew were based in Eagle Pass. One minute later, the pilot reported he had "a problem," and needed to return immediately. He was cleared to land on runway 12R. Witnesses said the airplane was flying low, the wings were "wobbling," and both engines were trailing dark black smoke. The airplane struck the ground about 1/2-mile northeast of the runway threshold.

AIRCRAFT INFORMATION

According to airplane maintenance records, Airworthiness Directive 87-21-02, which mandated the installation of fuel filler restrictors in the wing tanks, was accomplished on July 28, 1988. This was confirmed by visual inspection at the accident site.

WRECKAGE AND IMPACT INFORMATION

The airplane collided with an oak tree and came to rest at its base on a magnetic heading of 018 degrees. The base of the tree trunk was approximately 4 feet in diameter. The right wing was torn off and lay behind and 53 feet to the left of the airplane. There was evidence of a small ground fire around the wing. The right engine and propeller were located to the left and 65 feet ahead of the airplane. All three blades were in the feathered position. The left wing remained attached to the airplane by cables and hoses. The left engine was slightly behind and to the left of the airplane. One blade remained attached to the propeller hub and was bent toward the flat side near the tip. The tip was missing. The other two blades separated and were located nearby. Both blades were bent in an S-shape fashion and were curled in the direction of rotation.

The fuel manifolds on both engines were opened. The fuel color was blue and slightly cloudy, and the odor was similar to that of Jet-A. Several drops were placed on a sheet of paper, and an oily residue remained after slow evaporation. Fuel samples were taken from each tank and sent to two different laboratories for analysis (see TESTS AND RESEARCH).

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy (case no. 94-0227) and toxicological screen were performed on the pilot by the Bexar County Forensic Science Center. Results of the toxicological screen are attached to this report.

TESTS AND RESEARCH

Both engines were later disassembled and examined. Both engine cylinders had no deposits on their domes but the barrels were shiny. The right engine pistons had dark sooty deposits and the edges were eroded and melted away. There was a 3/4-inch hole burned through the top of the no. 5 piston. The left engine pistons had no deposits, but the edges were eroded and worn down to the first compression ring.

According to Petroleum Specialist Laboratory's report, the fuel sample from the right wing tank contained "a minimum of 50% contamination by a heavier petroleum product, i.e. Jet-A, JP-5, diesel." According to the Chemron Laboratory's report, there was 43% gasoline and 57% Jet-A in the left fuel tank sample, and 52% gasoline and 48% Jet-A in the right fuel tank sample."

ADDITIONAL INFORMATION

Shortly after the accident, an FAA inspector went to the fixed based operator and reviewed their fuel purchase invoices. Invoice no. 07555 indicated another airplane had been serviced with 60 gallons of 100LL gasoline. The beginning and ending meter readings were 1378973 and 1379033, respectively. The fuel truck meter registered 1379045. Invoice no. 07557 also had a starting meter reading of 1378973. The FAA inspector then examined the jet fuel invoices. The ending meter reading on invoice 07551 was 1306837 and the beginning meter reading on invoice 07558 was 1306897, a difference of 60 gallons. There were no other invoices to indicate jet fuel had been dispensed on that date.

Written statements were obtained from the two linemen who were on duty the morning of the accident. The first lineman said he serviced N741CA with 100LL fuel. The second lineman said he saw his co-workers driving the jet fuel truck. Later, he watched N741CA taxi for takeoff and observed "a white cloud of smoke come from behind the plane."

According to a spokesman for the fixed base operator, the jet fuel truck was not equipped with a restrictive fuel nozzle. When the fuel vendor was contacted, it was learned that the nozzle had been in the warehouse for the previous two years.

The wreckage was released to the owner's representative on February 12, 1994.

Pilot Information

Certificate:	Airline Transport; Commercial	**Age:**	29, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	**Last FAA Medical Exam:**	05/26/1993
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	5100 hours (Total, all aircraft), 400 hours (Total, this make and model), 3500 hours (Pilot In Command, all aircraft), 120 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	**Registration:**	N741CA
Model/Series:	421C 421C	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	421C-0899
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	12/03/1993, AAIP	**Certified Max Gross Wt.:**	7450 lbs
Time Since Last Inspection:	18 Hours	**Engines:**	2 Reciprocating
Airframe Total Time:	2916 Hours	**Engine Manufacturer:**	CONTINENTAL
ELT:	Installed	**Engine Model/Series:**	GTSIO-520-L
Registered Owner:	CRITICAL AIR MEDICINE, INC.	**Rated Power:**	375 hp
Operator:	CRITICAL AIR MEDICINE, INC.	**Operating Certificate(s) Held:**	On-demand Air Taxi (135)
Operator Does Business As:	EXECUTIVE AIR SERVICE	**Operator Designator Code:**	IBUA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	SAT, 809 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	0716 CST	**Direction from Accident Site:**	130°
Lowest Cloud Condition:	Unknown / 1200 ft agl	**Visibility**	7 Miles
Lowest Ceiling:	Overcast / 1200 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	
Precipitation and Obscuration:			
Departure Point:	(SAT)	**Type of Flight Plan Filed:**	IFR
Destination:	EAGLE PASS, TX (EGP)	**Type of Clearance:**	
Departure Time:	0711 CST	**Type of Airspace:**	Class D; Class E

Airport Information

Airport:	SAN ANTONIO INTERNATIONAL (SAT)	**Runway Surface Type:**	Concrete
Airport Elevation:	809 ft	**Runway Surface Condition:**	
Runway Used:	12R	**IFR Approach:**	
Runway Length/Width:	8502 ft / 150 ft	**VFR Approach/Landing:**	Forced Landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal, 1 Serious	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal, 1 Serious	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	ARNOLD W SCOTT,	**Report Date:**	01/11/1995
Additional Participating Persons:	JESUS M CAVAZOS; SAN ANTONIO, TX		
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/.		

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