



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	WEST MIFFLIN, PA	<b>Accident Number:</b>	NYC98FA060
<b>Date &amp; Time:</b>	01/06/1998, 1548 EST	<b>Registration:</b>	N1DK
<b>Aircraft:</b>	Cessna 500	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>		<b>Injuries:</b>	1 Serious, 2 Minor
<b>Flight Conducted Under:</b>	Part 91: General Aviation - Business		

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## Analysis

The pilot initiated an ILS approach with rain and fog. Approach flaps were maintained until the runway was sighted, and then landing flaps were set. The airplane landed long, overran the runway, struck the ILS localizer antenna on the departure end of the runway, and came to rest at the edge of a mobile home park. The airplane and two mobile homes were destroyed by fire. Vref had been computed at 110 Kts. The PIC reported a speed on final of 130 Kts, while the SIC said it was 140 Kts. Radar data revealed a 160 knots ground speed from the outer marker until 1.8 miles from touchdown. The airplane passed the control tower, airborne, with 2,500 feet of runway remaining on the 6,500 foot long runway. Performance data revealed that the airplane would require about 2,509 feet on a dry runway, and 5,520 feet on a wet runway. The airplane was not equipped with thrust reversers or anti-skid brakes. The PIC was the company president, and the SIC was a recent hire who had flown with the PIC three previous times. The PIC was qualified for single-pilot operations in the airplane, and had been trained to fly stabilized approaches.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the pilot to make a go-around when he failed to achieve a normal touchdown due to excessive speed, and which resulted in an overrun. Factors were the reduced visibility due to fog, and the wet runway.

## Findings

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Occurrence #1: OVERRUN

Phase of Operation: LANDING - ROLL

### Findings

1. (F) WEATHER CONDITION - FOG
2. (F) WEATHER CONDITION - RAIN
3. (F) TERRAIN CONDITION - WET
4. (C) AIRSPEED - EXCESSIVE - PILOT IN COMMAND
5. (C) PROPER TOUCHDOWN POINT - NOT ATTAINED - PILOT IN COMMAND
6. (C) GO-AROUND - NOT PERFORMED - PILOT IN COMMAND

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Occurrence #2: ON GROUND/WATER COLLISION WITH OBJECT

Phase of Operation: LANDING - ROLL

### Findings

7. OBJECT - RESIDENCE

## Factual Information

### HISTORY OF FLIGHT

On January 6, 1998, about 1548 eastern standard time, a Cessna 500 Citation, N1DK, was destroyed by impact forces and a post-crash fire when it over ran the runway, after it landed at the Allegheny County Airport (AGC), West Mifflin, Pennsylvania. The certificated commercial pilot-in-command (PIC) and pilot rated passenger (passenger) in the cabin received minor injuries, and the commercial rated co-pilot (SIC) in the cockpit was seriously injured. Instrument meteorological conditions prevailed for the business flight which last departed the Canton-Akron airport, Akron, Ohio (CAK), about 1500. The flight was conducted on an instrument flight rules (IFR) flight plan under 14 CFR Part 91.

The flight had originated from Statesville, North Carolina (SVH), with stops at AGC, and CAK. The return flight departed CAK, en route to SVH, with a planned stop at AGC.

According to transcripts of communications from the Federal Aviation Administration (FAA), the PIC flew the instrument landing system (ILS) approach to Runway 28 at AGC; however, the runway was not in sight at minimums, and a missed approach was initiated. The PIC then requested and executed the ILS approach to Runway 10, which had lower minimums.

According to the PIC, the approach was conducted with flaps at 15 degrees, and an airspeed of 130 knots. The approach speed (Vref) had been calculated as 110 knots. The airspeed of 130 knots was maintained until the approach lights became visible, at which time landing flaps were selected. The airplane touched down about 100 feet past the numbers on Runway 10. The runway was wet and he modulated the brakes for maximum effectiveness. The PIC was unable to stop the airplane on the runway and departed the end of the runway.

The SIC reported that the approach was flown at 140 knots and the Vref speed was computed at 109 knots. About 75 feet above Decision Height (250 feet AGL), the approach lights became visible and landing flaps were set. The approach was fast; however, the PIC elected to continue and land. The airplane touched down prior to the 3,000 feet of runway remaining sign. During the last 1,000 feet of runway, it became obvious that the airplane was not going to stop on the runway. The airplane departed the end of the runway and became momentarily airborne and then stopped. The PIC and passenger helped the SIC from the airplane.

The passenger in the cabin reported that he sensed the airplane was fast. He heard the SIC make the 1,000 above and 500 feet above minimums calls, and noted that the airspeed at 500 feet above minimums was 160 KIAS. The approach was coupled and centered on the localizer and glideslope. About 200 feet above minimums, the passenger could see the runway lights. The PIC retarded the power levers and landing flaps were set. The passenger felt the airplane balloon and pitch down when the flaps were set to landing. The speed brakes were toggled extended, and the touchdown occurred beyond mid-field, with no go-around was attempted. The PIC was modulating the brakes, and the passenger could feel the airplane shuddering. The passenger saw the 1,000 feet remaining runway marker and knew it was the wrong end of the runway. He thought the airplane would stop in the mud off the end of the runway, and took a brace position. He felt the rumble of the airplane in the turf, and then it became quite when the airplane became airborne.

The passenger saw a wing panel come off when the airplane hit the timbers. He

described the impact as "big." He was thrown into the seat in front. He tried to open the main cabin door, but it was jammed. There was a fire in the left rear passenger cabin. The roof and right side of the fuselage were peeled open. There was lots of debris in the airplane and a big fire on the right side of the airplane. He could see a 275 gal oil tank next to a trailer that was gushing oil.

The PIC and passenger carried the SIC out of the airplane, exiting through the open area on the right side. The SIC was bleeding from her face. The left engine had continued to operate after the impact and was increasing in RPM as they exited the airplane.

The control tower personnel reported that the airplane was airborne as it passed the intersection of Runway 13/31 where 2,500 feet of Runway 10 remained for landing, after which the airplane disappeared into the fog, while still airborne. A few seconds after the airplane disappeared from view, the localizer alarm and an emergency locator transmitter (ELT) signal were heard in the control tower.

The airport fire-fighting vehicle was dispatched to the departure end of the Runway 10. The occupants observed the airplane on fire at the edge of a mobile home park. Due to unsuitable vehicle terrain, they were unable to reach the accident site via airport property, and returned to the terminal area to exit the airport property. The fire fighting vehicle reached the site via off airport hard surface roads.

The accident occurred during the hours of daylight at 40 degrees, 21.26 minutes north latitude, and 79 degrees, 55.06 minutes west longitude.

#### OTHER DAMAGE

An approach light for Runway 28 and the support structure for the ILS Runway 10 localizer antenna was damaged. In addition, the impact and fire destroyed two mobile homes. Flying debris damaged two additional mobile homes.

#### PERSONNEL INFORMATION

The PIC held a commercial pilot certificate with ratings for single and multi-engine land, and instrument airplane. He also held a commercial type rating for the Cessna 500, with a single pilot exemption. The PIC reported his total time as 3,745 hours, with 1,260 hours in the Cessna 500. He had flown 120 hours in the preceding 90 days, including 90 hours in make and model. A review of the PIC's training record from SimuFlite revealed that he had received his authorization to operate the Cessna 500 in single PIC operations on April 6, 1997.

The PIC was issued a second class FAA Airman Medical Certificate with no limitations on February 27, 1997. The SIC held a commercial pilot certificate with ratings for single and multi-engine land, and instrument airplane. She also held a commercial type rating for the Cessna 500. She reported her total time as 946 hours, with 150 hours in the Cessna 500. She had flown 62 hours in the preceding 90 days, including 20 hours in make and model. A review of FAA records revealed that she had passed a PIC check in the Cessna 500 on April 25, 1997.

She was issued a first class FAA Airman Medical Certificate with no limitations on July 22, 1997.

#### AIRCRAFT INFORMATION

The airplane was originally certificated for two pilot operations, and had been modified

for single pilot operations. In addition, the wings had been extended in accordance with supplemental type certificate (STC) SA2172NM, and the JT-15D-1 engines had been replaced with higher thrust JT-15D-1A engine in accordance with STC SA8176SW. The airplane was not equipped with thrust reversers or an anti-skid braking system.

#### METEOROLOGICAL INFORMATION

According to a recording of the air/ground communications between the airplane and control tower, the winds were reported as calm. The weather reported immediately after the accident included winds from 130 degrees at 4 knots, a ceiling of 300 feet overcast, prevailing visibility 1/4 mile, Runway 28, runway visual range (RVR) 1,200 feet, and light rain and fog.

RVR was not available for Runway 10. The PIC reported visibility greater than 3/4 of a mile when he acquired the runway environment on the approach. The SIC reported that she acquired the runway environment when the airplane was about 75 feet above the decision height (200 feet AGL).

#### AIRDROME INFORMATION (Destination)

Allegheny County Airport was certificated under FAR 139, with an airport rescue and fire fighting (ARFF) category A rating. The landing Runway 10/28 was equipped with ILS approaches on each end. The runway surface was concrete, and grooved. It was not crowned.

According to airport data from the FAA, Runway 10 was 6,500 feet long and 150 feet wide. During the investigation, small puddles of standing water were observed on the runway following periods of rain. The puddles were aligned with the seams between concrete slabs, and the depth in all cases was about 1/4 inch or less. A check with airport personnel revealed no previous problem with standing water on the runway and landing airplanes.

#### RADAR AND OTHER REMOTELY RECORDED DATA

Radar data was received from Pittsburgh Approach Control, and forwarded to National Transportation Safety Board (NTSB) Headquarters in Washington, DC where a recorded radar study of the accident approach was conducted. The data revealed the airplane crossed the outer marker at a ground speed of 163 knots, and maintained a ground speed of 164 knots until about 1.8 nautical miles (NM) from the approach end of Runway 10, at which time the ground speed dropped to 158 knots. The airplane was unable to be tracked below an altitude of 1,800 feet mean sea level (MSL) due to surrounding terrain.

#### WRECKAGE AND IMPACT INFORMATION

The airplane was examined at the accident site on January 6th through 8th, 1998.

A light skid mark was found on the runway, which started 257 feet prior to the departure end of the runway. The skid mark was aligned with a tire mark in the grass, which was identified as the right main landing gear tire. The mark measured 60 feet long, disappeared for about 40 feet, and then was visible for another 157 feet to the end of the runway. The width of the skid mark measured about 4 inches wide when first found and measured about 6.5 inches wide when it exited the runway.

Parallel tire marks were found in the grass at the end of the runway. The right side tire mark was aligned with the skid mark found on the runway. The left side tire mark was aligned with the white paint of the runway centerline, and no skid mark was visible on the white paint.

The tire marks in the grass measured about 12 feet, 6 inches apart and continued for 238 feet. A lighter intermittent tire mark was found midway between the two tire marks. The published main landing gear width was 12 feet, 7 inches. When the tire marks ended, the terrain dropped down on a slope, which was measured at 28 degrees.

The next ground impact marks were found on the poles used to support the Runway 10 localizer antenna. The marks were located 98 feet further, and 10 feet lower than the previous ground marks. The impact marks were about 13.5 feet above the ground. The outboard wing panels from both wings were found forward and outboard of the poles. The outboard wings had separated near the flap/aileron boundary. The airplane struck the ground, continued forward, penetrated a chain link fence, and came to rest against 2 mobile homes, 33 feet after striking the localizer antenna structure

The cockpit, and cabin was destroyed by fire.

The landing gear was extended, and the wing flaps were in the landing position. The upper and lower speed brakes were extended on the right wing. Impact and fire destroyed the inboard left wing.

Flight control continuity was verified to the elevator and rudder horn which had separated from the rudder. Flight control continuity was verified to the right aileron. The left wing was destroyed by fire and flight control continuity could not be verified.

The elevator trim tab was measured with the tab 2.5 degrees down (elevator up). The rudder and aileron trim tabs were near neutral.

The lower rear portion of the rudder was crushed up and forward.

Both main landing gear wheel/brake assemblies were removed and taken to the Pittsburgh School of Aeronautics for further examination. Wear measurements taken on the brake linings revealed several areas where the brakes were worn beyond the maximum allowed. According to the FAA Airworthiness Inspector who participated in the investigation, it was not possible to determine if the brakes were within limits when inspected 34 hours prior to the accident because the wear would be dependent upon pilot technique for the brakes and the number of landings since the last inspection.

The right main landing gear tire had worn areas. Examination of the areas revealed the rubber at the edges of the worn areas was rough and had an appearance of being exposed to heat. The left main landing gear tire was ruptured and had been exposed to thermal conditions on over 50 percent of its surface area.

#### MEDICAL AND PATHOLOGICAL INFORMATION

The PIC and SIC volunteered to give blood for toxicological examination. The toxicological report from the FAA Toxicology Accident Research Laboratory, Oklahoma City, Oklahoma was negative for drugs and alcohol for both pilots.

#### ADDITIONAL INFORMATION

The PIC was the owner of a company that maintained a fleet of airplanes on a 14 CFR 135 certificate for on-demand charter. N1DK was used as his personal airplane and not listed on the FAR 135 certificate.

The operator had employed the SIC for 2 months. She had flown with the PIC three

previous times, including one previous time in the Cessna 500. When asked what her duties were, she reported that she read the checklist and set the radios. When she was asked if she had called for a go-around, she reported that she thought about a go-around, but did not verbalize it.

The primary source of landing information was the FAA approved flight manual supplement by Sierra Industries, Inc. According to the first page of the supplement:

**"THE INFORMATION CONTAINED HEREIN SUPPLEMENTS THE INFORMATION OF THE BASIC AIRPLANE FLIGHT MAUAL. FOR LIMITATIONS PROCEDURES AND PERFORMANCE INFORMATION NOT CONTAINED IN THIS SUPPLEMENT CONSULT THE BASIC AIRPLANE FLIGHT MANUAL."**

The following was extracted from page IV-32 and IV-33 of the Cessna Citation Operating Manual:

"Landing field length data in the FAA Approved Airplane Flight Manual assumes a threshold crossing speed of  $V_{ref}$  at an altitude of 50' [feet] down the runway. In practice, it is suggested that for minimum field operations the threshold be crossed at comfortable obstacle clearance altitude allowing some deceleration to take place approaching the runway. Touchdown should occur with maximum available runway remaining at minimum safe speed."

"ADVERSE FIELD CONDITIONS All flight manual field length data assumes a dry, hard surface runway except where otherwise noted. Precipitation covered runway conditions will degrade braking effectiveness and will require significantly greater actual takeoff abort and landing field lengths."

"Considerations for landing on a precipitation-covered runway are similar to those for short field operations where velocity and speed are minimized and maximum roll out distance is made available. Runway composition, condition and construction, the amount of precipitation and the depth of main landing gear tire tread remaining affect the magnitude of braking degradation so it is impossible to apply a fixed factor to cover all conditions. Please refer to the FAA Approved Airplane Flight Manual, Section VII Advisory Information for data that will permit estimation of the minimum runway required under various precipitation-covered runway conditions. Again, maximizing roll out runway available and touching down at minimum safe speed will provide the greatest possible margin."

"With precipitation cover on the runway, braking should be very judicious. If runway length permits, delay braking slightly until some aerodynamic deceleration has taken place. Under normal braking conditions the optional antiskid system is very effective in preventing skids and producing minimum stopping distances; however, on a precipitation-covered runway, the phenomenon of hydroplaning may greatly reduce the antiskid effectiveness, due to the possibility of the airplane wheels not rotating up to a speed equal to the airplane's ground speed. Airplanes equipped with the optional skid warning system instead of the antiskid system will experience the same reduced effectiveness. With 100 PSI main tires, the CITATION's minimum dynamic hydroplaning initiating ground speed may occur at speed above approximately 70 knots. Since ground speed is the critical factor, landing on precipitation-covered runways with any tailwind component should be avoided. Good tread depth tends to relieve hydrodynamic pressure under the tire on wet runways and inflation is important because a low tire pressure lowered the minimum hydroplaning speed. Anticipated operation on precipitation-covered runways dictates close monitoring of tire condition and

pressure."

According to Section VIII ADVISORY INFORMATION, Page 8-3.1 of the FAA Approved airplane flight manual:

"The takeoff and landing distance charts presented in Section IV are based on smooth, dry, hard surfaced runways. Correction factors for adverse runway conditions are presented below."

The dry runway landing distances obtained in Section IV were to be multiplied by the correction factors.

Correction Factor - Wet Runway - Less than 0.01 inch water 1.45

Correction Factor - Water - Less than 0.5 inch water 2.20

According to the performance charts, the airplane would require about 2,509 feet for a dry runway, and 5,520 feet for a wet runway.

According to the Cessna Citation Operating Manual, the following airspeed should be used:

	Flaps Up	Vref + 20 Knots	Flaps Approach (15
degree)	Vref + 10 Knots	Flaps Landing	Vref [Vap]

The PIC had received his training and single pilot authorization from SimuFlite. According to SimuFlite's training profile, ILS approaches were taught with the airplane configured as follows:

One Dot Below Glideslope      Gear Down  
Flaps 15 degrees

At Glideslope Intercept      Flaps 35 degrees  
Airspeed Vap

The aircraft wreckage was released to the Assistant Director of Allegheny County Airport on January 8, 1998.

## Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	53, 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, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 Valid Medical--no waivers/lim.	<b>Last Medical Exam:</b>	02/27/1997
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	3745 hours (Total, all aircraft), 1260 hours (Total, this make and model), 3698 hours (Pilot In Command, all aircraft), 120 hours (Last 90 days, all aircraft), 64 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	Cessna	<b>Registration:</b>	N1DK
<b>Model/Series:</b>	500 500	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	500-175
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	9
<b>Date/Type of Last Inspection:</b>	12/02/1997, Annual	<b>Certified Max Gross Wt.:</b>	12500 lbs
<b>Time Since Last Inspection:</b>	34 Hours	<b>Engines:</b>	2 Turbo Fan
<b>Airframe Total Time:</b>	7124 Hours	<b>Engine Manufacturer:</b>	P&W
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	JT15D-1A
<b>Registered Owner:</b>	US MOTOR SPORTS	<b>Rated Power:</b>	2200 lbs
<b>Operator:</b>	DONALD K. ULRICH	<b>Air Carrier Operating Certificate:</b>	On-demand Air Taxi (135)
<b>Operator Does Business As:</b>	US MOTORSPORTS INC.	<b>Operator Designator Code:</b>	D4KA

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Day
Observation Facility, Elevation:	AGC, 1252 ft msl	Observation Time:	1549 EST
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:	Unknown / 0 ft agl	Temperature/Dew Point:	14° C / 14° C
Lowest Ceiling:	Overcast / 300 ft agl	Visibility	0.25 Miles
Wind Speed/Gusts, Direction:	4 knots, 130°	Visibility (RVR):	0 ft
Altimeter Setting:	30 inches Hg	Visibility (RVV):	0 Miles
Precipitation and Obscuration:			
Departure Point:	AKRON, OH (CAK)	Type of Flight Plan Filed:	IFR
Destination:	(AGC)	Type of Clearance:	IFR
Departure Time:	1500 EST	Type of Airspace:	Class D

## Airport Information

Airport:	ALLEGHENY COUNTY (AGC)	Runway Surface Type:	Concrete
Airport Elevation:	1252 ft	Runway Surface Condition:	Wet
Runway Used:	10	IFR Approach:	ILS
Runway Length/Width:	6500 ft / 150 ft	VFR Approach/Landing:	None

## Wreckage and Impact Information

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

## Administrative Information

Investigator In Charge (IIC):	ROBERT L HANCOCK	Adopted Date:	08/03/1999
Additional Participating Persons:	WILLIAM KOSHAR; WEST MIFFLIN, PA JEFF HALLIDAY; WEST MIFFLIN, PA ANDREW HALL; WICHITA, KS		
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> .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.