National Transportation Safety Board
Aviation Accident Final Report

Location:	Wilmington, North Carolina	**Accident Number:**	ERA09LA130
Date & Time:	January 4, 2009, 02:09 Local	**Registration:**	N815MA
Aircraft:	Cessna 550	**Aircraft Damage:**	Substantial
Defining Event:	Fuel exhaustion	**Injuries:**	7 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During a night, northbound, international overwater flight that paralleled the east coast of the southeast United States, the airplane encountered headwinds. Upon arrival at the intended destination, the weather was below forecasted conditions, resulting in multiple instrument approach attempts. After the first missed approach, the controller advised the crew that there was an airport 36 miles to the north with "much better" weather, but the crew declined, citing a need to clear customs. During the third missed approach, the left engine lost power, and while the airplane was being vectored for a fourth approach, the right engine lost power. Utilizing the global positioning system, the captain pointed the airplane toward the intersection of the airport's two runways. Approximately 50 feet above the ground, he saw runway lights, and landed. The captain attempted to lower the landing gear prior to the landing, but it would not extend due to a lack of hydraulic pressure from the loss of engine power, and the alternate gear extension would not have been completed in time. The gear up landing resulted in damage to the underside of the fuselage and punctures of the pressure vessel. The captain stated that the airplane arrived in the vicinity of the destination with about 1,000 pounds of fuel onboard or 55 minutes of fuel remaining. However, air traffic and cockpit voice recordings revealed that the right engine lost power about 14 minutes after arrival, and the left engine, about 20 minutes after arrival. Federal air regulations require, for an instrument flight rules flight plan, that an airplane carry enough fuel to complete the flight to the first airport of landing, fly from that airport to an alternate, and fly after that for 45 minutes at normal cruising speed. The loss of engine power was due to fuel exhaustion, with no preaccident mechanical anomalies noted to the airplane.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A loss of engine power due to the crew's inadequate in-flight fuel monitoring.

Findings

Personnel issues	Fuel planning - Pilot
Personnel issues	Decision making/judgment - Pilot
Environmental issues	Low ceiling - Contributed to outcome

Factual Information

HISTORY OF FLIGHT

On January 4, 2009, at 0209 eastern standard time, a Cessna 550, N815MA, was substantially damaged when it impacted a runway during a forced landing with the landing gear retracted at Wilmington International Airport (KILM), Wilmington, North Carolina. The airplane departed La Isabela Airport (MDJB), Santa Domingo, Dominican Republic, on January 3, 2009, about 2220. The certificated airline transport pilot captain, certificated commercial pilot first officer, and five passengers were not injured. The flight was operated under the provisions of Title 14 Code of Federal Regulations Part 91. Instrument meteorological conditions prevailed at the time of the accident and an instrument flight rules (IFR) flight plan was filed for the international flight.

The captain reported that there were 5,008 pounds of fuel on board for the 1,090 nautical mile (straight line) flight and that they had planned to depart earlier; however, they were waiting for passengers.

During an interview with the Federal Aviation Administration (FAA) inspector on scene, as well as one with an NTSB investigator, the captain stated that the airplane "ran out of fuel." The crew had attempted three instrument landing system (ILS) approaches to runway 24; however, due to fog at the airport, the crew was unable to see the runway environment. On the third missed approach, the No. 1 engine shut down and the pilots requested a vector from air traffic control (ATC) for a fourth approach. The first officer then stated to ATC that they were low on fuel.

While being vectored for the fourth approach, the No. 2 engine shut down and the crew requested an immediate turn to the airport. Utilizing the airplane's global positioning system, they were able to locate the center of the airport and "aimed the airplane at the intersection of the runways." Approximately 50 feet above ground level (agl), the captain saw a row of lights, paralleled the lights, landed gear up heading southwest near taxiway G, which intersected runway 6/24. The airplane subsequently overran the runway and impacted several approach light stands for runway 24, coming to rest 2,242 feet past the point of the initial touchdown.

In a written statement, the captain also noted that he had tried to lower the landing gear prior to the landing; however, the airplane was "too low," and the landing gear would not extend without engine power.

PERSONNEL INFORMATION

The captain held an airline transport pilot certificate with ratings for airplane single-engine land, airplane multiengine land, and a type rating in the accident airplane make and model. He reported 6,914 total hours of flight experience, including 5,986 hours as pilot in command (PIC). He reported 1,400 total hours of flight experience in the accident airplane make and model, including 914 hours as PIC. The captain did not report the date of his most recent flight review. His most recent FAA first class medical certificate was issued on May 3, 2007.

The first officer held a commercial pilot certificate, with ratings for airplane single-engine land, airplane multiengine land, and instrument airplane. He reported 1,716.6 total hours of flight experience, including 1,137.1 total hours of flight experience in multiengine airplanes. His most recent flight review was completed on November 24, 2007 and his most recent FAA first class medical certificate was issued on March 6, 2008.

AIRCRAFT INFORMATION

The accident airplane was manufactured in 1982, and was issued an airworthiness certificate on May 20, 1982. The airplane was powered by two Pratt and Whitney JT15D-4 Series turbofan engines. According to the captain, the airplane was last inspected utilizing a conditional airworthiness inspection on September 10, 2008, and at that time, the airplane had accrued 11,123 total hours of service.

METEOROLOGICAL INFORMATION

The 0153 recorded weather observation at KILM included winds from 020 degrees at 3 knots, a broken cloud layer at 100 feet agl, an overcast cloud layer at 500 feet agl, 1/2 statute mile (sm) visibility in fog, temperature 11 degrees C, dew point 10 degrees C, and an altimeter setting of 30.14 inches of mercury.

In a completed NTSB Pilot/Operator Report, the captain indicated that he had received a weather briefing via telephone/computer. In a written statement, the captain noted that the weather forecast for KILM "for this flight was 800 to 900 overcast and 3 sm visibility."

According to the 032339Z TAF (Terminal Area Forecast), KILM weather for the arrival time was expected to include calm winds, visibility in excess of 6 sm, and a broken cloud layer at 700 feet.

During a telephone interview, the captain reported that the airplane had encountered "severe headwinds" en route to KILM.

COMMUNICATION

According to FAA partial transcripts of radio communications, the crew initially contacted Miami Air Route Traffic Control Center (ARTCC) at 2233, and reported to be level at flight level 280. At 0022, the flight was cleared to descend to flight level 270. At 0050, the flight was cleared to contact Jacksonville ARTCC, which was complied with. At 0121, the controller issued a pilot's discretionary descent to 5,000 feet above mean sea level (msl). At 0133, the crew was told to contact Washington ARTCC.

The crew made initial contact with Washington ARTCC at 0134, and reported descending to 5,000 feet msl. The controller informed the crew of the weather for KILM and confirmed that they wanted vectors for the ILS runway 24 approach. At 0147, the controller cleared the flight for the approach.

At 0150, the first officer informed the controller that they were on the missed approach and would like to "shoot another approach."

At 0152, the controller informed the crew that, at an airport 36 miles to the north of KILM, the "weather is much better." The first officer informed the controller that they had to clear customs at KILM.

At 0155, the controller again cleared the airplane for the ILS runway 24 approach.

At 0157, the first officer requested "another approach."

At 0201, the controller cleared the airplane for another ILS runway 24 approach.

At 0204:30, the first officer informed the controller, "...we have an emergency one engine out."

At 0204:34, the controller asked, "can you make it to albert ellis," and the first officer responded, "how far can you give me a vector right away." The controller then stated, "ah fly heading of ah zero one zero," which the first officer acknowledged.

At 0204:45, the controller stated, "roger it's thirty six miles north of Wilmington," and the first officer responded, "ah we can not do this we are we have low fuel."

At 0205:38, the first officer stated, "we [have] low fuel we got [low] fuel." The controller then vectored the airplane toward runway 35.

The last radio transmission from the first officer was at 0209:33, when he responded, "mike" to the controller stating that the airplane was directly over the airport.

At 0210:30, the controller advised, "november eight one mike five mike alpha radar contact lost."

According to the cockpit voice recorder transcript, at 0149, the first officer advised the controller of the missed approach; at 0203, the captain stated to the first officer, "we just lost an engine;" and at 0209, there were sounds consistent with the loss of power from the second engine.

AIRPORT INFORMATION

The airport air traffic control tower hours of operation were from 0600 to 2300 local time and it was closed at the time of the accident flight's arrival. The airport also had two crossing runways. The longest runway was 6/24, which was 8,016 feet long and 150 feet wide. The crossing runway was 17/35, which was 7,004 feet long and 150 feet wide. Runway 6/24 was equipped with pilot-activated approach and runway lights. The airport was served by three ILS approaches.

FLIGHT RECORDERS

The cockpit voice recorder was auditioned and transcribed. The information heard was consistent with the information that the pilots reported to NTSB investigators both in a telephone interview and in writing.

WRECKAGE AND IMPACT INFORMATION

The airplane was examined by an FAA inspector who responded to the accident site. The airplane sustained skin damage to the underside of the fuselage and several puncture holes into the pressure vessel. No other damage was noted.

ADDITIONAL INFORMATION

The Cessna Citation Operators Manual, Section VII, "Performance – Flight Planning" charts, revealed that at flight level (FL) 290 with a 25-knot headwind condition, the flight would be able to travel 1,302 nautical miles (nm). At FL270, the flight would be able to travel 1,239 nm. The distances included utilizing all fuel on board and flying at a specific climb and cruise profile; however, they do not take into consideration the amount of distance and time to complete an instrument approach.

The actual flight profile flown was not determined.

Federal Air Regulation 91.167, Fuel Requirements for Flight in IFR Conditions, states, in part, "(a) No person may operate a civil aircraft in IFR conditions unless it carries enough fuel (considering weather reports and forecasts and weather conditions) to –

(1) Complete the flight to the first airport of landing;
(2) Fly from that airport to the alternate airport; and
(3) Fly after that for 45 minutes at normal cruising speed."

According to the captain's written statement, the airplane arrived at KILM with "about 1,000 lbs of fuel (00.55 minutes) remaining."

The Cessna Citation Operating Manual, Section II, "Airplane and Systems," also noted that the landing gear was electrically controlled and hydraulically operated, and that there was an emergency extension system that could be actuated by a red AUX GEAR CONTROL T-handle located under the pilot's instrument panel.

History of Flight

Approach-IFR missed approach	Fuel exhaustion (Defining event)
Approach-IFR missed approach	Loss of engine power (total)
Emergency descent	Landing gear not configured
Landing-flare/touchdown	Abnormal runway contact

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	38,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	June 23, 2007
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 18, 2007
Flight Time:	(Estimated) 6914 hours (Total, all aircraft), 1400 hours (Total, this make and model), 5986 hours (Pilot In Command, all aircraft), 147 hours (Last 90 days, all aircraft), 49 hours (Last 30 days, all aircraft), 7 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Commercial	**Age:**	28,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	March 6, 2008
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 24, 2007
Flight Time:	(Estimated) 1717 hours (Total, all aircraft), 1454 hours (Pilot In Command, all aircraft), 82 hours (Last 90 days, all aircraft), 19 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N815MA
Model/Series:	550	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Transport	**Serial Number:**	5500406
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	September 10, 2008 Condition	**Certified Max Gross Wt.:**	13300 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:	11123 Hrs as of last inspection	**Engine Manufacturer:**	Pratt and Whitnety Canada
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	JT15D-4
Registered Owner:		**Rated Power:**	2500 Lbs thrust
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	KILM,32 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	01:53 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:		**Visibility**	0.5 miles
Lowest Ceiling:	Broken / 100 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	20°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.13 inches Hg	**Temperature/Dew Point:**	11°C / 10°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	Santa Domingo (MDJB)	**Type of Flight Plan Filed:**	IFR
Destination:	Wilmington, NC (KILM)	**Type of Clearance:**	IFR
Departure Time:	22:20 Local	**Type of Airspace:**	

Airport Information

Airport:	Wilmington International Airpo KILM	**Runway Surface Type:**	Asphalt
Airport Elevation:	32 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	06	**IFR Approach:**	Global positioning system;ILS
Runway Length/Width:	8016 ft / 150 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	5 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	7 None	**Latitude, Longitude:**	34.27639,-77.890556(est)

Administrative Information

Investigator In Charge (IIC):	Etcher, Shawn
Additional Participating Persons:	Jim Creider; FAA/FSDO; Greensboro, NC James Marek; FAA - AVP100; Washington, DC Jon Cooper; Cessna Aircraft Company; Wichita, KS
Original Publish Date:	December 20, 2010
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=73198

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