



National Transportation Safety Board Aviation Accident Final Report

Location:	Reading, PA	Accident Number:	NYC08FA265
Date & Time:	08/03/2008, 1519 EDT	Registration:	N827DP
Aircraft:	CESSNA 550	Aircraft Damage:	Substantial
Defining Event:	Ground collision	Injuries:	2 None
Flight Conducted Under:	Part 91: General Aviation - Positioning		

Analysis

The air traffic controller, with both ground and local (tower) responsibilities, cleared the accident airplane to land when it was about 8 miles from the runway. Another airplane landed in front of the accident flight, and the controller cleared that pilot to taxi to the hangar. The controller subsequently cleared a tractor with retractable (bat wing) mowers, one on each side, and both in the “up” position, to proceed from the terminal ramp and across the 6,350-foot active runway at an intersection about 2,600 feet from the threshold. The controller then shifted his attention back to the airplane taxiing to its hangar, and did not see the accident airplane land. During the landing rollout, the airplane’s left wing collided with the right side of the tractor when the tractor was “slightly” left of runway centerline. Calculations estimated that the airplane was about 1,000 feet from the collision point when the tractor emerged from the taxiway, and skid marks confirmed that the airplane had been steered to the right to avoid impact. Prior to the crossing attempt, the tractor operator did not scan the runway, and was concentrating on the left side bat wing. Federal Aviation Administration publications do not adequately address the need for ground vehicle operators to visually confirm that active runways/approaches are clear, prior to crossing with air traffic control authorization, thus overlooking an additional means to avoid a collision.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The air traffic controller’s failure to properly monitor the runway environment. Contributing to the accident was the tractor operator’s failure to scan the active runway prior to crossing, and the Federal Aviation Administration’s inadequate emphasis on vehicle operator visual vigilance when crossing active runways with air traffic control clearance.

Findings

Personnel issues	Monitoring environment - ATC personnel (Cause) Monitoring environment - Airport personnel (Cause)
Organizational issues	Adequacy of safety program - FAA/Regulator (Factor)

Factual Information

HISTORY OF FLIGHT

On August 3, 2008, at 1519 eastern daylight time, a Cessna 550 (Citation), N827DP, was substantially damaged when it collided with a crossing mowing tractor while landing at Reading Regional Airport/Carl A. Spatz Field (RDG), Reading Pennsylvania. The captain, first officer, and tractor operator were not injured. Visual meteorological conditions prevailed, and no flight plan had been filed for the flight from Pottstown Limerick Airport (PTW), Pottstown, Pennsylvania, to Reading. The positioning flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

A National Transportation Safety Board Air Traffic Control Group convened at the airport on August 5 and 6, 2008. According to the Group Factual Report, the air traffic controller had been working both the local (tower) position and the ground control position for 21 minutes before the accident. When the controller transmitted on one position's frequency, it would also transmit on the other.

According to the controller, when the Citation crew called the tower at 8 miles, "VFR" to the southeast for landing, the controller cleared the airplane to land on runway 31. A single-engine Rockwell Commander subsequently landed, and the controller instructed that pilot to taxi to the ramp. The controller was observing the Commander taxi in to the ramp, when "Tractor 8" called to cross runway 31 at taxiway D. The controller then approved the tractor to cross as requested.

The controller further stated that he watched the tractor proceed outbound as he observed the Commander taxiing inbound, and did not observe the Citation's landing. Upon hearing the Citation crew radio the tower, the controller turned to see the Citation and the tractor, both stationary, along with a piece of the Citation's wing, on the runway.

The Air Traffic Control Group Report also noted that the tractor was a John Deere Model 6310, used for both mowing and snowplow operations. A photograph of the tractor revealed two retractable (bat wing) mowers, one on each side, and a third mower attached to the rear of the tractor. The Group Report also diagrammed the path of the Citation as coming from the tractor operator's right side, and that the impact occurred "slightly left" of the runway 31 centerline, at taxiway D.

According to written statements from the tractor operator, after he was cleared by the controller, he proceeded from the terminal ramp, along taxiway B and turned right on taxiway D. Approaching the runway, the bat wing mower attached to the left side of the tractor began to drop. The operator grabbed the control lever to raise the wing to the "up" position, and looked to the left to ensure it was latched. As he looked, the tractor proceeded onto the runway, and the next thing the operator knew, he saw a white "blur" and the tractor's front window was "smashed." The operator then shut down the tractor, disembarked, and went over to the airplane to check on the crew.

An FAA air safety investigator interviewed the crew. The captain reported that about 8 miles from the airport, the tower controller cleared the airplane for a straight-in approach and landing to runway 31. The captain later heard "something about runway 31" about 5 miles from touchdown, but didn't recall what was said, and around that time, called for full flaps. The airplane subsequently touched down with full flaps, approximately 1,000 feet from the runway

threshold, and had decelerated to about 80 knots when the collision occurred. The captain also noted that he saw the tractor on the runway out of the corner of his eye just before impact.

In a written statement, the captain further stated that upon rollout, he saw the tractor emerge from the left, moving right. He moved the airplane to the right side of the runway, but could not avoid the collision.

The first officer reported that he saw the tractor just before impact, and that it appeared to be moving at the time. He did not recall hearing any radio transmissions about activity on the runway.

According to a written transcript provided to the Air Traffic Control Group by the Reading Air Traffic Control Tower (ATCT) facility:

At 1512:56, a Rockwell Commander was cleared to land on runway 31.

At 1515:14, one of the pilots from the Citation contacted the controller, who cleared the airplane to land on runway 31, which was acknowledged.

At 1515:47, the controller advised the Commander pilot to “turn left next taxiway this frequency to the hangar good day.”

At 1515:54, the Commander pilot stated, “left on delta with you.”

At 1517:16, the tractor operator transmitted, “ground tractor 8,” and shortly thereafter, “terminal ramp like to head over alongside of the quest hangar do some mowing alongside the soil over there.”

At 1517:27, the controller stated, “tractor 8 cross 31 delta to the quest hangar area,” which the tractor operator acknowledged.

At 1519:11, one of the pilots of the Citation transmitted, “reading tower citation 827 delta papa,” to which the controller responded, “hey citation 7 delta papa roger.”

PERSONNEL INFORMATION

The captain held an airline transport pilot certificate with airplane single engine land, multiengine land, and numerous type ratings. His latest FAA first class medical certificate was obtained on October 1, 2007. The captain reported 12,100 hours of total flight time, with 2,690 hours in make and model.

The first officer held a commercial pilot certificate with airplane single engine land and multiengine land ratings. His latest FAA second class medical certificate was obtained on May 21, 2008. The first officer reported 1,779 hours of total flight time, with 65 hours in make and model.

The air traffic controller had 27 years of air traffic control experience. He also held a private pilot certificate with a single engine land rating. According to the Air Traffic Control Group report, he had been facility-rated at Reading since October 1999, and had been a U.S. Air Force controller from 1976 to 1979. The controller was working the fifth evening of a 1-week duration of evening shifts.

The tractor operator last received training, and was tested on that training, on August 13, 2008. On his training sheet, he acknowledged that he received and read, among other items, “Driving on the AOA – Airport Vehicle Operator Safety Guide,” and “Ground Vehicle

Operations on Airport, AC 150/5210-20.”

AIRPORT INFORMATION

Runway 31 was 6,350 feet long and 150 feet wide, and taxiway D was located about 2,600 feet from the runway threshold.

According to the Air Traffic Group Factual Report, Reading ATCT was a combined approach control and air traffic control tower. The arrival radar/approach position was located in the tower cab, “with limited visibility of the airfield.”

At the time of the accident, tower staffing consisted of a flight data controller, an arrival radar/approach controller combined with the controller-in-charge position, and a combined local (tower)/ground controller position.

A front line manager/operations supervisor was also on duty at the time, but was performing administrative functions in an office separate from the tower cab.

The Group Report further noted that, “There were no hindrances to visibility of the area at and around the collision site on the airfield from the tower cab.”

WRECKAGE AND IMPACT INFORMATION

Photographs of the Citation and the tractor revealed that the left wing of the Citation had struck the right side of the tractor, with the bat wings on both sides of the tractor in the up position. The Citation lost about 10 feet of the left wing.

Another photograph revealed two tire skid marks that correlated to the Citation's left and right main landing gear. Both skid marks were positioned to the right of runway centerline, and both suddenly curved to the left in the vicinity of the collision.

ADDITIONAL INFORMATION

- Distance Before Impact -

According to the airport director, the maximum permitted speed of the tractor in the airport operations area was 15 mph. Utilizing an estimated 10 mph, or 15 feet per second, would have required 5 seconds for the tractor to reach runway centerline from the taxiway. Noting that the Citation slowed after touchdown, but utilizing an estimated 120-knot approach speed, or 202 feet per second, indicates that the Citation would have been about 1,000 feet from the collision point when the tractor left the taxiway.

- Air Traffic Control Procedures -

According to FAA 7110.65, Air Traffic Control, Paragraph 3-1-3, USE OF ACTIVE RUNWAYS: “The local controller has primary responsibility for operations conducted on active runways and must control the use of those runways.”

According to FAA 7110.65, Air Traffic Control, Paragraph 3-15, VEHICLES/EQUIPMENT/PERSONNEL ON RUNWAYS: “Ensure that the runway to be used is free of all known ground vehicles, equipment, and personnel before a departing aircraft starts takeoff or a landing aircraft crosses the runway threshold.”

- Ground Vehicle Vigilance -

In “Best Practices for Airfield Safety,” located on the FAA’s web site, there are three categories: one each for air traffic controllers, pilots, and airport personnel. For both pilots and airport personnel, a best practice listed is: “Conduct ‘Clearing Turns’ prior to entering ANY runway.”

“Airport Ground Vehicle Operations, An FAA Guide” details vehicle runway crossings at non-towered airports, including, “look both ways and then look UP for aircraft that are landing or taking off.” However, the guide says nothing about vehicle operators visually confirming that an active runway/approach is clear when authorized by ATCT to cross.

In discussing ground vehicle runway incursions, FAA Advisory Circular (AC) 150/5210-20, “Ground Vehicle Operations on Airports,” Appendix B, paragraph 4.7, “Safety,” states: “An example of an incursion is a vehicle at an airport with an operating ATCT straying onto a runway in front of an aircraft.” The AC also discusses in general terms the concept of situational awareness, but it also does not specifically address the need for a vehicle operator to confirm that an active runway/approach is actually clear when authorized by ATCT to cross.

Reading Airport’s FAA-approved Airport Certification Manual (ACM) included “Procedures for Ground Vehicle Operations” and, consistent with the noted FAA publications, it did not specifically address ground vehicle operators visually confirming that an active runway/approach was clear before crossing with ATCT clearance.

- Safety Enhancements -

As a result of this accident, the Reading Regional Airport Certification Manual was changed to include the following in Section 329 (c), “Procedures for Ground Vehicle Operations” item 3. “Vehicles shall remain behind taxiway hold lines until ATCT has given proper clearance to cross a runway. Upon receipt of any clearance from ATC to cross a runway or taxiway, vehicle operators shall look both ways to ensure it is safe to cross.”

On January 25, 2010, suggestions were provided to the FAA via the AAI-100 (Office of Accident Investigation) party representative to the investigation, to: 1) Revise both the FAA’s “Airport Ground Vehicle Operations, An FAA Guide” and FAA AC150/5210-20 publications to include ground vehicle operators’ requirement to visually confirm that an active runway was clear prior to crossing, even with ATCT clearance, 2) Review airport ACMs and airport-ATCT Letters of Agreement to ensure that appropriate language is included for vehicle operators’ runway vigilance, even with ATCT clearance, and 3) That FAA ensure that the increased vehicle operators’ vigilance requirements be incorporated into local airport ground vehicle training programs.

History of Flight

Landing-landing roll	Runway incursion veh/AC/person Ground collision (Defining event)
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Pilot Information

Certificate:	Airline Transport	Age:	50, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 With Waivers/Limitations	Last Medical Exam:	10/01/2007
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	11/06/2007
Flight Time:	12100 hours (Total, all aircraft), 2690 hours (Total, this make and model), 5810 hours (Pilot In Command, all aircraft), 44 hours (Last 90 days, all aircraft), 12 hours (Last 30 days, all aircraft)		

Co-Pilot Information

Certificate:	Commercial	Age:	51
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 With Waivers/Limitations	Last Medical Exam:	05/21/2008
Occupational Pilot:	No	Last Flight Review or Equivalent:	08/06/2007
Flight Time:	1779 hours (Total, all aircraft), 65 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	CESSNA	Registration:	N827DP
Model/Series:	550	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	660
Landing Gear Type:	Retractable - Tricycle	Seats:	9
Date/Type of Last Inspection:	05/16/2008, Continuous Airworthiness	Certified Max Gross Wt.:	14300 lbs
Time Since Last Inspection:		Engines:	2 Turbo Fan
Airframe Total Time:	5008 Hours	Engine Manufacturer:	Pratt and Whitney
ELT:	Installed, not activated	Engine Model/Series:	J-T-15D
Registered Owner:	Drug Plastics and Glass Company	Rated Power:	3500 lbs
Operator:	Drug Plastics and Glass Company	Air Carrier Operating Certificate:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	RDG, 344 ft msl	Observation Time:	1454 EDT
Distance from Accident Site:		Direction from Accident Site:	
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	27° C / 15° C
Lowest Ceiling:		Visibility	10 Miles
Wind Speed/Gusts, Direction:	7 knots/ 19 knots, 290°	Visibility (RVR):	
Altimeter Setting:	29.87 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Pottstown, PA (PTW)	Type of Flight Plan Filed:	None
Destination:	Reading, PA (RDG)	Type of Clearance:	None
Departure Time:	1505 EDT	Type of Airspace:	

Airport Information

Airport:	Reading Regional/Carl A Spaatz (RDG)	Runway Surface Type:	Asphalt
Airport Elevation:	344 ft	Runway Surface Condition:	Dry
Runway Used:	31	IFR Approach:	None
Runway Length/Width:	6350 ft / 150 ft	VFR Approach/Landing:	Full Stop; Straight-in

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	40.378333, -75.965000 (est)

Administrative Information

Investigator In Charge (IIC):	Paul R Cox	Adopted Date:	05/11/2010
Additional Participating Persons:	T.R. Proven; FAA/AAI-100; Washington, DC Michele Wroblewski; Natl Air Traffic Controllers Assn; Washington, DC		
Publish Date:	07/19/2011		
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.nts.gov/pubdms/ .		

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