



National Transportation Safety Board Aviation Accident Final Report

Location:	San Francisco, CA	Accident Number:	SEA08LA061A
Date & Time:	01/13/2008, 1929 PST	Registration:	N705SK
Aircraft:	Bombardier, Inc. CL-600-2C10	Aircraft Damage:	Substantial
Defining Event:	Ground collision	Injuries:	60 None
Flight Conducted Under:	Part 121: Air Carrier - Scheduled		

Analysis

A Boeing 757-222 airplane and a Bombardier Inc. CL-600-2C10 were substantially damaged when the tails of both airplanes collided during the pushback process from two adjacent terminal gates during night visual meteorological conditions. The flight crew of the CL-600-2C10 reported that during the final stages of pushback from gate 79, they were in a stopped position with both engines running while their ground crew was in the process of disconnecting the tug when the collision occurred. Company maintenance personnel stated they were pushing the 757-222 back from gate 80 without the use of wing-walkers or tail walkers to relocate the airplane to another location on the airport and did not see the CL-600-2C10. Review of Air Traffic Control (ATC) communication recordings between ground control and both airplanes revealed that the 757-222 was initially cleared for pushback onto taxiway alpha from gate 80. About 41 seconds later, the ground controller cleared the CL-600-2C10 to push back onto taxiway alpha from gate 79. The recordings revealed that the ground controller did not advise either aircraft of near simultaneous adjacent pushback operations. The controller stated that he believed there was room for both aircraft to push back and did not foresee a traffic conflict.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The company tug operator of the other airplane's failure to maintain clearance with this aircraft during the pushback process. Also causal was the ground controller's failure to alert the pilot of this aircraft and tug operator of the other airplane of the simultaneous pushback occurring from adjacent gates. Contributing to the accident was the company's pushback operation without the use of wing/tail walkers.

Findings

Personnel issues	Identification/recognition - Maintenance personnel (Cause) Incomplete action - Ground crew (Factor) Lack of communication - ATC personnel (Cause)
Environmental issues	Dark - Not specified Aircraft - Awareness of condition
Organizational issues	Adequacy of policy/proc - Not specified

Factual Information

On January 13, 2008, approximately 1929 Pacific standard time, a Boeing 757-222, N508UA, operated by United Airlines (UAL) was being towed by company maintenance personnel and collided with a Bombardier Inc. CL-600-2C10, N705SK, that was being operated by SkyWest Inc. doing business as United Express at San Francisco International Airport (SFO), San Francisco, California . The Bombardier Inc. CL-600-2C10 was being operated as flight 6398 under the provisions of Title 14 Code of Federal Regulations (CFR) Part 121 scheduled passenger service. There were no injuries to the two airline transport pilots, two flight attendants, and the 55 passengers onboard the Bombardier Inc. CL-600-2C10, or to the one maintenance personnel on board the Boeing 757. Both airplanes were substantially damaged. Night visual meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for the Bombardier Inc. CL-600-2C10 with the intended destination of Boise Air Terminal/Gowen Field, Boise, Idaho.

Three witnesses located adjacent to terminal 3, gates 79 and 80 reported observing a Boeing 757 pushback from gate 80 and subsequently collide with a Bombardier Inc. CL-600-2C10 that was stationary and in the final stages of disconnecting the tug from the airplane. The witnesses stated that prior to the collision, they observed the ground crew from the Bombardier Inc. CL-600-2C10 attempt to stop the tug operator of the Boeing 757. Two witnesses added that they did not observe anyone acting as a wing walker for the Boeing 757.

The captain of the Bombardier Inc. CL-600-2C10 reported in a written statement after being cleared to pushback onto taxiway alpha from gate 79 by ground control, the ground crew proceeded to push back the airplane with wing walkers on the left and right side. During the final stages of pushback, both engines were running with the brakes set and the ground crew was cleared to disconnect the tug from the airplane. A few seconds later, the tug driver expressed concern to the captain about another aircraft pushing back from an adjacent gate. The captain stated that due to the angle the airplane was positioned, he could see the other aircraft pushing back and asked the first officer to verify the clearance with the Boeing 757. The first officer informed the captain that if the other aircraft pushing back would stop, "it would not be an issue." Subsequently, the captain observed the ground crew of the Bombardier Inc. CL-600-2C10 running in the direction of the Boeing 757 just prior to the collision.

The first officer of the Bombardier Inc. CL-600-2C10 reported in a written statement that after being pushed back onto the taxiway, they were in the process of setting the parking brake and preparing for the ground crew to disconnect the tug when the ground crew notified them of the Boeing 757 pushing back from an adjacent gate. The first officer stated that the ground crew started running towards the Boeing 757 just prior to the collision. The first officer added that he didn't see anyone acting as wing walkers escorting the Boeing 757.

Written statements provided by the ground crew for the Bombardier Inc. CL-600-2C10 revealed that the left and right wing walkers were in the process of disconnecting the tug from the airplane as they observed the Boeing 757 being pushed back towards their position and started running towards the tug operator prior to the collision. The ground crew added that the Boeing 757 had no wing walkers during their pushback sequence.

In a written statement, the UAL tug operator reported that he was cleared to pushback from

gate 80 onto taxiway alpha. During the pushback process, a UAL employee positioned in the Boeing 757 flight deck asked the tug operator if the tow bar had broke. The tug operator stopped the tug to see what happened and saw United Express ramp workers running in towards his location. He added that during the pushback, he was "continuously monitoring ground frequency" and did not hear any references to Tug 80. The UAL tug operator reported to SFO Airport Authority shortly after the collision that during the pushback process, he was looking over his shoulder and didn't see the other aircraft pushback from Gate 79.

The UAL employee positioned in the flight deck of the Boeing 757 reported he was operating the brakes of the aircraft during the pushback process. As the airplane approached the centerline of taxiway Alpha, he felt "several bumps" and asked the UAL tug operator "if he had broken the tow bar or if we had hit something."

Examination of both airplanes by a Federal Aviation Administration (FAA) inspector revealed that the Bombardier Inc. CL-600-2C10 exhibited damage to the vertical stabilizer, rudder, and elevator. The Boeing 757 sustained damage to the rudder and elevator. SFO Airport Authority reported that the tug that was pushing back the Boeing 757 remained connected by the tow bar and was facing away from the airplane.

Review of communication recordings between the San Francisco Air Traffic Control Tower (ATCT) facility and both aircraft revealed that the UAL maintenance crew initially transmitted to ATCT at 1927:54, "San Francisco Ground, this is United tug eighty requesting pushback on alpha." The controller issued a clearance to tug eighty to pushback onto taxiway alpha. The UAL maintenance crew acknowledged the clearance stating "pushing back on alpha, tug eighty." At 1928:35, the Bombardier Inc. CL-600-2C10 flight crew contacted ground requesting pushback from gate 79 with Yankee and was subsequently cleared to pushback onto taxiway alpha. The recordings revealed the controller did not advise either aircraft of pushback from the adjacent gates.

According to the SFO Air Traffic Control Tower (ATCT) Quality Assurance Review report, the ground controller believed there was room for both aircraft to push back and did not foresee a traffic conflict.

According to the letter of agreement (LOA) between the San Francisco Tower and San Francisco Airport Commission, the controllers are required to ensure the safe and efficient movement and separation of aircraft and vehicles operating on any portion of the airport movement area. The movement areas are defined as the runways, taxiways and other areas of an airport, which are utilized for taxiing, takeoff and landing of aircraft exclusive of loading ramps and parking areas as depicted in the current LOA between San Francisco International Airport (SFIA) and SFO ATCT. The LOA required ground controllers to provide advisory service as practicable to aircraft and vehicles on non-movement areas of the airport. The ground controller has jurisdiction over all airport movement areas, except runway(s) designated active. The inactive runways shall be released to ground control.

SFO ATCT Order 7220.2G, "Standard Operating Procedures (SOP)," paragraph 2-3-5, Non-Movement/Movement Area Operating Procedures states, in part:

a. All aircraft that push back onto taxiway Alpha shall be instructed "push back onto taxiway Alpha approved."

b. All aircraft that push back onto taxiway Alpha but need to be held short of Alpha shall be instructed, "Push back your discretion, hold short of taxiway Alpha." When aircraft can be

pushed back onto taxiway Alpha, the aircraft shall be instructed, "Push back onto taxiway Alpha approved."

c. All aircraft that do not push back onto the movement area shall be instructed, "Push back your discretion."

f. Work load permitting, traffic advisories in the non-movement area will be given. Do not issue control instructions to aircraft in the non-movement area. Use only advisory phrases in exchange of traffic information.

Review of company procedure manuals revealed that within the UAL Maintenance Operating Procedures Manual - NMOP Handling, paragraph 8, subpart C, it stated in part "aircraft will be pushed back from the gate using standard verbiage, with the tractor facing the aircraft (nose to nose)." The section further stated in part "maintenance towing performed by maintenance personnel may be accomplished with the tractor connected tail to nose of the aircraft. This procedure may only be accomplished by A&P licensed maintenance technicians who are properly trained."

In paragraph 8, Towing - Responsibilities, the manual stated in part "when Signal or Guide Person(s) are used, they will be responsible for their respective assigned areas. Should the person on the tractor elect to move the airplane without assistance, they will be responsible for the operation."

In paragraph 10, Towing - Close Quarters, the manual stated in part "when towing in close quarters, the person on the tractor will have two assistants (in addition to the person in the Flight Deck), one positioned at each wing tip. These people are to assist the tow tractor operator with the use of approved hand signals. If the tail assembly is not visible to the Wing Walkers, a third person must be positioned at the tail.

A. For clarification, only one person will relay signals to the person on the tractor. This person will be known as the SIGNAL PERSON. This person may also perform the function of a Guide Person if they are in a position to be seen by the person on the tractor.

B. The person located near the wing tips or tail section will be known as the GUIDE PERSON. The Guide Person will be responsible for the safe operation that pertains to their area, also to see that the signal person receives proper signals."

Review of UAL company training records revealed that both the maintenance person onboard the Boeing 757 and the tug operator had complied with company training requirements for towing and repositioning the aircraft.

History of Flight

Pushback/towing

Ground collision (Defining event)

Pilot Information

Certificate:	Airline Transport; Commercial	Age:	39, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):		Restraint Used:	Seatbelt, Shoulder harness
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:	09/01/2007
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	11/01/2007
Flight Time:	6797 hours (Total, all aircraft), 4347 hours (Total, this make and model), 150 hours (Last 90 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Flight Instructor; Commercial	Age:	36, Male
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):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 1 Without Waivers/Limitations	Last FAA Medical Exam:	07/01/2007
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	03/01/2007
Flight Time:	1999 hours (Total, all aircraft), 685 hours (Total, this make and model), 177 hours (Last 90 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Bombardier, Inc.	Registration:	N705SK
Model/Series:	CL-600-2C10	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	10145
Landing Gear Type:	Retractable - Tricycle	Seats:	70
Date/Type of Last Inspection:	01/01/2008, Continuous Airworthiness	Certified Max Gross Wt.:	75250 lbs
Time Since Last Inspection:	2643 Hours	Engines:	2 Turbo Fan
Airframe Total Time:	10507 Hours at time of accident	Engine Manufacturer:	General Electric
ELT:	Installed, not activated	Engine Model/Series:	CF34-8C1
Registered Owner:	Skywest Airlines Inc.	Rated Power:	13780 lbs
Operator:	Skywest Airlines Inc.	Operating Certificate(s) Held:	Flag carrier (121)
Operator Does Business As:	United Express	Operator Designator Code:	SWIA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night
Observation Facility, Elevation:	KSFO, 13 ft msl	Observation Time:	1956 PST
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:	Clear	Temperature/Dew Point:	11° C / 7° C
Lowest Ceiling:	None	Visibility:	10 Miles
Wind Speed/Gusts, Direction:	Calm	Visibility (RVR):	
Altimeter Setting:	30.27 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Francisco, CA (KSFO)	Type of Flight Plan Filed:	IFR
Destination:	Boise, ID (KBOI)	Type of Clearance:	VFR
Departure Time:	PST	Type of Airspace:	Class B

Airport Information

Airport:	San Francisco International (KSFO)	Runway Surface Type:	
Airport Elevation:	13 ft	Runway Surface Condition:	
Runway Used:	N/A	IFR Approach:	Unknown
Runway Length/Width:		VFR Approach/Landing:	Unknown

Wreckage and Impact Information

Crew Injuries:	5 None	Aircraft Damage:	Substantial
Passenger Injuries:	55 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	60 None	Latitude, Longitude:	37.618889, -122.374722

Administrative Information

Investigator In Charge (IIC):	Joshua Cawthra	Adopted Date:	08/28/2008
Additional Participating Persons:	Steve Crutcher; Federal Aviation Administration; San Francisco, CA John McCoy; United Airlines; San Francisco, CA Chris C Brown; SkyWest Airlines; St. George, UT		
Publish Date:	03/31/2010		
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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