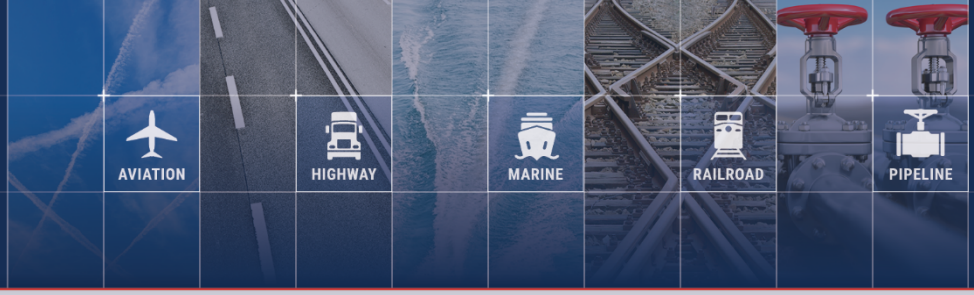

Aviation Investigation Final Report

Location:	San Francisco, California	**Incident Number:**	OPS17IA014
Date & Time:	February 15, 2017, 20:00 Local	**Registration:**	N214NN (A1); N627VA (A2)
Aircraft:	EMBRAER S A ERJ 170-200 LR (A1); Airbus A320 (A2)	**Aircraft Damage:**	None (A1); None (A2)
Defining Event:	Air traffic event	**Injuries:**	N/A (A1); N/A (A2)
Flight Conducted Under:	Part 121: Air carrier - Scheduled (A1); Part 121: Air carrier - Scheduled (A2)		

Analysis

The Boulder sector approach controller was the first controller the pilot of CPZ6081 contacted when entering NCT airspace. The controller informed the pilot that the ATIS was "tango" and to expect a visual approach to runway 28L.

Aircraft arriving from the south of SFO were routinely assigned runway 28L on initial contact; however, when noise abatement procedures were in effect, runway 28R was the preferential runway.

When the Boulder controller realized that CPZ6081 would arrive at SFO during noise abatement hours, he informed the Woodside controller that he would change CPZ6081 to runway 28R. The Boulder controller subsequently changed CPZ6081's data tag on the radar display from runway 28L to runway 28R and electronically handed the airplane off to the Woodside controller.

The Boulder controller did not inform the pilot of CPZ6081 about the runway change to 28R and did not inform the Woodside controller that he had not passed that runway change information to the pilot.

CPZ6081's data tag indicated runway 28R when the Woodside controller accepted the airplane.

When the Woodside controller cleared CPZ6081 for the visual approach to runway 28R, that was the first mention of runway 28R to the pilot. The pilot read back "runway 28R," however, continued to prepare for the runway 28L approach. The flight crew had briefed for a visual approach to runway 28L with a backup ILS to runway 28L and thought they had been cleared for the runway 28L approach.

The Woodside controller electronically handed off CPZ6081 to SFO ATCT, and the SFO local controller accepted the handoff; the data tag on the tower radar display indicated runway 28R.

The pilot of CPZ6081 contacted SFO tower and reported they were on a visual approach to runway 28L. The local controller issued the wind and cleared CPZ6081 to land "runway 28L," which the pilot read back correctly.

When the local controller instructed VRD920 to LUAW on runway 28L, she visually scanned the approach corridor and saw CPZ6081 on final approach, and then scanned the tower radar display and saw that CPZ6081's data tag indicated runway 28R. She stated that although it was difficult to visually discern which runway (28L/28R) an aircraft was lined up for, especially at night, she expected CPZ6081to land on runway 28R, and thought she had cleared the flight to land on runway 28R.

The local control audio revealed that the local controller had been consistent in providing traffic information to a pilot when she put an airplane into LUAW when another airplane was on the approach for that runway; however, in this case she had not provided traffic information to VRD920 or CPZ6081.

The airport surface surveillance capability (ASSC) system functioned as designed and produced the appropriate alert when CPZ6081 was approximately .85 nautical mile final runway 28L. The local controller took timely and appropriate action when the ASSC alerted and issued go-around instruction to CPZ6081; the pilot adhered to the go-around instruction.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be:

The local controller's issuance of a landing clearance for runway 28L to the ERJ170, and the subsequent issuance of line up and wait instructions to the A320 for runway 28L, resulting in a runway incursion.

Findings

Personnel issues (A1)	Accuracy of communication - ATC personnel
Personnel issues (A1)	Expectation/assumption - ATC personnel
Personnel issues (A1)	Following instructions - Pilot
Personnel issues (A1)	Use of automation - ATC personnel
Environmental issues (A1)	(general) - Contributed to outcome
Personnel issues (A2)	Understanding/comprehension - ATC personnel

Factual Information

History of Flight

Landing (A1)	Air traffic event (Defining event)
Approach-IFR final approach (A1)	Wrong surface or wrong airport
Taxi-into takeoff position (A2)	Air traffic event

On February 15, 2017, about 2000 PST, a runway incursion occurred on runway 28L at San Francisco International Airport (SFO), San Francisco, California when the SFO Airport Traffic Control Tower (ATCT) local controller cleared an Embraer, ERJ170, N214NN, Compass Airlines flight 6081 (CPZ6081) to land on runway 28L, and subsequently instructed an Airbus, A320, N627VA, Virgin America flight 920 (VRD920) to line up and wait (LUAW) on the same runway. The closest proximity between the two airplanes occurred when CPZ6091 executed a tower directed go around and overflew VRD920 in LUAW on runway 28L; radar data indicated CPZ6091 had descended to about 125 feet mean sea level (msl).

Both flights were operated under the provisions of Title 14 *Code of Federal Regulations* Part 121. CPZ6081was a regularly scheduled flight from Los Angeles International Airport (LAX), Los Angeles, California to SFO, and VRD920 was a regularly scheduled flight from SFO to McCarran International Airport (LAS), Las Vegas, Nevada. There were no injuries reported to the crew or passengers of either flight, and no damage to the aircraft. Night visual meteorological conditions prevailed at the time of the incident.

HISTORY OF FLIGHT

About 1944, the pilot of CPZ6081 checked in with the Northern California Terminal Radar Approach Control (NCT) Boulder sector approach controller. The controller advised the pilot that automatic terminal information service (ATIS) information was "tango" and to expect a runway 28 left (28L) visual approach to SFO. The pilot acknowledged.

About 1953, the Boulder sector controller instructed the pilot of CPZ6081 to contact the Woodside approach controller. The pilot contacted the controller, reporting level at 8,000 feet. The controller informed the pilot to expect a lower altitude in about 5 miles, and then issued the pilot a heading toward the airport. The pilot acknowledged.

About 1954, the Woodside controller issued the pilot of CPZ6081 a heading and descent to 4,000 feet. The pilot read back the instructions.

About 1955, the Woodside controller issued the pilot a heading toward the airport and informed the pilot that SFO Airport was at the aircraft's 10 o'clock and 16 miles. The pilot reported the SFO Airport insight.

The controller then cleared the pilot of CPZ6081 for a visual approach to runway 28 right (28R). The pilot read back, "Cleared visual approach runway 28 right...."

About 1957, the Woodside controller instructed the pilot of CPZ6081 to contact SFO tower. The pilot acknowledged.

The pilot of CPZ6081 contacted SFO tower reporting, "…visual runway 28 left." The SFO local controller responded, "…runway 28 left, [wind] one-eight-zero at one-three. The pilot acknowledged, "Cleared to left, cleared to land…."

According to the CPZ6081 pilot, the event flight was a "standard flight" and was an "easy day." They briefed for the visual approach to runway 28L and were going to back up the approach with the Instrument Landing System (ILS) approach to runway 28L. The pilots thought the flight was cleared for the visual approach to runway 28L. Although they considered that their flight was above the anticipated flight path for the visual approach, the airplane was configured and stable by 1,000 feet above ground level (agl). The flight was switched over from the approach frequency to the tower frequency prior to the outer maker. The pilot monitoring contacted tower and the flight was cleared to land on runway 28L, about 10 miles from the runway threshold. The captain, at the request of the pilot flying, requested a wind speed check from the ATCT controller.

About 1959, the local controller instructed VRD920 to LUAW on runway 28L. The pilot of VRD920 acknowledged the instruction and taxied onto runway 28L.

According to the captain of VRD920, after SFO ATCT had issued them a LUAW clearance onto runway 28L, he illuminated the nose light, runway turn off lights, strobes, and the landing lights were extended but remained "OFF", as required by company guidance, until they were issued a takeoff clearance. The flight crew reported that the airplane had no maintenance deferrals and that there were no exterior light deferrals on the aircraft. The first officer further stated that the exterior lights were operable and operating at the time of the overflight. The captain of VRD920 did not hear the pilots of CPZ6081 check in with SFO ATCT or hear them receive a clearance to land on runway 28L.

The VRD920 captain further stated that after an extended wait time on the runway, which was estimated to be about a minute and a half, the pilots monitored their traffic collision avoidance system (TCAS) and discussed the "close proximity of the target [CPZ6081] on final." The pilots stated that due to the close proximity of runway 28L and runway 28R, it was difficult to determine the runway that the TCAS target was lined up with.

At 2000:13, the airport surface surveillance capability (ASSC) system display in SFO ATCT generated an aural and visual alert indicating a conflict between CPZ6081 and VRD920. FAA radar and ASSC data indicated that CPZ6081 was about .85 mile from the runway 28L threshold and at 500 feet, and VRD920 was in LUAW runway 28L.

Six seconds after the ASSC alert was generated the local controller instructed the pilot of CPZ6081 to "go around." The pilot acknowledged, "go around, go around." ASSC data indicated CPZ6081 was approximately .56 mile from the runway threshold and at 300 feet at the time the local controller issued

go around instructions. The flight crew complied with the instructions. Figure 1 is a screenshot of the ASSC display at the time the local controller issued the go around instructions to CPZ6081.

Figure 1. ASSC display screenshot illustrating the position of VRD920 and CPZ6081 when the SFO local controller issued go around instructions.

The local controller subsequently issued climb out instructions to the pilot of CPZ6081. As CPZ6081 executed the go around, radar data indicated that CPZ6081 had descended to about 125 feet as it overflew runway 28L.

The VRD920 flight crew stated that they heard SFO ATCT issue CPZ6081 a "go around" clearance, and the crew heard and felt the vibration of the CPZ6091 airplane during the go-around.

The local controller instructed the pilot of CPZ6081 to contact NCT approach control, and one minute later issued a takeoff clearance to the pilot of VRD920.

CPZ6081's first officer described the area at the approach end of the runway as "darker than normal" and the captain reported seeing what appeared to be a "vague light" on the runway.

The remainder of both flights were uneventful.

RADAR DATA

ASSC data was provided by SFO and was used as the source data for this report.

WEATHER INFORMATION

The SFO weather for February 15, 2017 was obtained from the KSFO automated surface observing system (ASOS). The aviation routine weather report (METAR) at the time of the incident was:

METAR KSFO 160356Z 20019KT 10SM FEW100 BKN120 BKN180 16/04 A2999 RMK AO2 SLP155 T01560039=

KSFO routine weather observation at 1956 PST was wind from 200° at 19 knots, 10 statute miles visibility or greater, few clouds at 10,000 ft agl, broken ceiling at 12,000 ft agl, broken skies at 18,000 ft agl, temperature 16° C, dew point temperature 4° C, altimeter 29.99 in Hg. Remarks, station with a precipitation discriminator, sea level pressure 1015.5 hPa, temperature 15.6° C, dew point temperature 3.9° C.

Information

Certificate:	**Age:**
Airplane Rating(s):	**Seat Occupied:**
Other Aircraft Rating(s):	**Restraint Used:**
Instrument Rating(s):	**Second Pilot Present:**
Instructor Rating(s):	**Toxicology Performed:**
Medical Certification:	**Last FAA Medical Exam:**
Occupational Pilot:	**Last Flight Review or Equivalent:**
Flight Time:	

Aircraft and Owner/Operator Information (A1)

Aircraft Make:	EMBRAER S A	**Registration:**	N214NN
Model/Series:	ERJ 170-200 LR 200LR	**Aircraft Category:**	Airplane
Year of Manufacture:	2015	**Amateur Built:**	
Airworthiness Certificate:	Unknown	**Serial Number:**	17000508
Landing Gear Type:	Retractable - Tricycle	**Seats:**	88
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	20000 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:		**Engine Manufacturer:**	GE
ELT:	Installed, not activated	**Engine Model/Series:**	CF34-8E5
Registered Owner:	American Airlines Inc	**Rated Power:**	14510 Lbs thrust
Operator:	Compass Airlines	**Operating Certificate(s) Held:**	Flag carrier (121)

Aircraft and Owner/Operator Information (A2)

Aircraft Make:	Airbus	**Registration:**	N627VA
Model/Series:	A320 214	**Aircraft Category:**	Airplane
Year of Manufacture:	2006	**Amateur Built:**	
Airworthiness Certificate:	Unknown	**Serial Number:**	2851
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	169756 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:		**Engine Manufacturer:**	Cfm Intl
ELT:	Installed, not activated	**Engine Model/Series:**	CFM56-5B4/P
Registered Owner:	Wells Fargo Trust Co Na Trustee	**Rated Power:**	12010 Horsepower
Operator:	Alaska Airlines	**Operating Certificate(s) Held:**	Flag carrier (121)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	KSFO,18 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	19:56 Local	**Direction from Accident Site:**	330°
Lowest Cloud Condition:	Few / 10000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 12000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	19 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	200°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.98 inches Hg	**Temperature/Dew Point:**	16°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Los Angeles, CA (LAX) (A1); San Francisco, CA (SFO) (A2)	**Type of Flight Plan Filed:**	IFR (A1); IFR (A2)
Destination:	San Francisco, CA (SFO) (A1); Las Vegas, NV (LAS) (A2)	**Type of Clearance:**	IFR (A1); IFR (A2)
Departure Time:		**Type of Airspace:**	Class B (A1); Class B (A2)

Airport Information

Airport:	San Francisco Intl SFO	**Runway Surface Type:**	Asphalt
Airport Elevation:	13 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:	28L	**IFR Approach:**	Visual
Runway Length/Width:	11381 ft / 200 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information (A1)

Crew Injuries:	N/A	**Aircraft Damage:**	None
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	N/A	**Latitude, Longitude:**	37.611667,-122.35888

Wreckage and Impact Information (A2)

Crew Injuries:	N/A	**Aircraft Damage:**	None
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	N/A	**Latitude, Longitude:**	37.611667,-122.35888

Administrative Information

Investigator In Charge (IIC):	Koschig, Betty
Additional Participating Persons:	David Waudby; Federal Aviation Administration; Washington, DC Lydia Baune; National Air Traffic Controllers Association; Spokane, WA
Original Publish Date:	March 31, 2021
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB traveled to the scene of this incident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=94762