Aviation Investigation Final Report

Location:	Seattle, Washington	**Incident Number:**	SEA04IA045
Date & Time:	February 24, 2004, 09:30 Local	**Registration:**	N368SW
Aircraft:	Boeing 737-300	**Aircraft Damage:**	None
Defining Event:		**Injuries:**	94 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

While west of the airport, the flight crew was cleared for the Bay Visual Approach to Runway 16 Right. The First Officer, who was flying at the time, made a right turn over Elliott Bay and lined up on what he believed to be Runway 16 Right, but was in fact Taxiway Tango. When the aircraft was about one mile from the end of the taxiway, the first officer noticed a yellow X located just off the northern end of the surface he intended to land on. Upon realizing he was lined up on the wrong surface, he initiated a sidestep to Runway 16 Right. He subsequently completed an uneventful landing on Runway 16 Right, and taxied to the gate for a normal deplanement of the passengers. According to recorded radar tracking data, at the time of the turn to initiate the sidestep, the aircraft was approximately 600 feet above the ground (AGL). The size and shape of the taxiway made it look very much like a runway to the First Officer, and although he was eventually able to see the Runway 16 Right identification markings, because of the glare on the wet surfaces, he never did clearly see any markings that indicated Taxiway Tango was a taxiway. Although the Captain had correctly identified the runway surface when the aircraft first rolled out on final, flight deck distractions kept him from realizing that the first Officer was lined up on the taxiway until the sidestep maneuver was initiated.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: The First Officer's misidentification of the parallel taxiway as the active runway, resulting in the need for a sidestep maneuver while on short final for a full-stop landing. Factors include sun-glare from wet paved surfaces, a visual illusion created by the size and shape of the taxiway, and the Captain's failure to adequately monitor the First Officer’s approach.

Findings

Occurrence #1: MISCELLANEOUS/OTHER
Phase of Operation: APPROACH - VFR PATTERN - FINAL APPROACH

Findings
1. (C) WRONG RUNWAY - SELECTED - COPILOT/SECOND PILOT
2. (F) VISUAL ILLUSION - COPILOT/SECOND PILOT
3. (F) MONITORING - INADEQUATE - PILOT IN COMMAND
4. (F) AIRPORT FACILITIES,RUNWAY/LANDING AREA CONDITION - WET
5. (F) LIGHT CONDITION - SUNGLARE

Factual Information

On February 24, 2004, approximately 0930 Pacific standard time, the First Officer of a Southwest Airlines 737-300, N368SW, inadvertently aligned the aircraft for a landing on Taxiway Tango at Seattle-Tacoma International Airport (SEATAC), Seattle, Washington. There were no injuries to the flight crew, three flight attendants, or any of the 89 passengers, and there was no damage to the aircraft, which is owned and operated by Southwest Airlines Company. The scheduled Part 121 domestic passenger flight, which departed Oakland, California, about 85 minutes prior to the incident, was being operated in visual meteorological conditions at the time of the subject event. The flight had been on an IFR flight plan, and had been cleared for a visual approach to Runway 16 Right at SEATAC.

According to the flight crew, while they were west of the airport, the flight was cleared for the Bay Visual Approach to Runway 16 Right. The First Officer, who was flying at the time, made a right turn over Elliott Bay and lined up on what he believed to be Runway 16 Right. When the aircraft was about one mile from the end of the taxiway, the first officer noticed a yellow X located just off the northern end of the surface he intended to land on. Upon realizing he was lined up on the wrong surface, he initiated a sidestep to Runway 16 Right. He subsequently completed an uneventful landing on Runway 16 Right, and taxied to the gate for a normal deplanement of the passengers. According to recorded radar tracking data, at the time of the turn to initiate the sidestep, the aircraft was approximately 600 feet above the ground (AGL).

In a post-incident interview, the First Officer said that he did not realize he was lined up to land on the wrong surface until he saw the yellow X. He also said that there were varying degrees of reflection and glare at different areas of the airfield environment, and that the size and shape of the taxiway made it look very much like a runway. He further stated that although he was eventually able to see the Runway 16 Right identification markings, he never did clearly see any markings that indicated Taxiway Tango was a taxiway. When advised that there was also a temporary lighted-X near the permanent yellow X, he responded that the only X he had seen was the solid yellow X. When told that the Runway 16 centerline lights were on in the dim position, he said that he did not remember seeing them, even after executing the sidestep maneuver.

In a post-incident interview with the Captain, he stated that he knew which surface was the runway and which was the taxiway soon after the aircraft rolled out on final, but at the time he first visually acquired the runway environment, it looked to him like the First Officer was lining up on Runway 16 Right. The Captain explained that since they had been cleared to land long, his attention was diverted from the runway environment while he explained the landing/deceleration technique he wanted the first Officer to use, and then waited for the First Officer's response. He added that almost immediately after the First Officer confirmed that he understood his instructions, the First Officer made a comment and started a shallow left turn.

At that point, the Captain briefly checked the airspeed, and then returned his attention to the runway/taxiway environment. He said that it was at that point in time when he realized that the First Officer had lined up to the right (west) of Runway 16 Right, and was now correcting to it. He also mentioned that he too briefly saw the yellow X at that point in time. The Captain said that he thought briefly about a go-around, but since the bank angle was shallow, and the runway very nearby, he elected to let the First Officer continue the sidestep.

At the time of the event, the airport's paved surfaces were wet from a recent rain shower, and although the Captain was aware of the note on the airport diagram advising crews not to mistake Taxiway Tango for a landing surface, this note was not discussed prior to or during the approach sequence. He said that because the ILS was out, they had no localizer backup. Both crew members mentioned that there was a need for a better/clearer identification of the runways, but that some type of markings making it clear that Taxiway Tango is not a runway was the most important action that could be taken.

Pilot Information

Certificate:	Airline transport	**Age:**	56,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 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	November 13, 2003
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	December 21, 2003
Flight Time:	25000 hours (Total, all aircraft), 12000 hours (Total, this make and model), 10000 hours (Pilot In Command, all aircraft), 240 hours (Last 90 days, all aircraft), 80 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Airline transport	**Age:**	34,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):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	May 4, 2003
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	November 3, 2003
Flight Time:	6700 hours (Total, all aircraft), 2500 hours (Total, this make and model), 3500 hours (Pilot In Command, all aircraft), 240 hours (Last 90 days, all aircraft), 80 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Boeing	**Registration:**	N368SW
Model/Series:	737-300	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	26579
Landing Gear Type:	Retractable - Tricycle	**Seats:**	145
Date/Type of Last Inspection:	December 2, 2003 Continuous airworthiness	**Certified Max Gross Wt.:**	139000 lbs
Time Since Last Inspection:	640 Hrs	**Engines:**	Turbo fan
Airframe Total Time:	36024 Hrs at time of accident	**Engine Manufacturer:**	General Electric
ELT:	Not installed	**Engine Model/Series:**	CFM-56
Registered Owner:	SOUTHWEST AIRLINES CO	**Rated Power:**	20000 Lbs thrust
Operator:		**Operating Certificate(s) Held:**	Flag carrier (121)
Operator Does Business As:	Southwest Airlines	**Operator Designator Code:**	SWAA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	
Observation Facility, Elevation:	SEA,433 ft msl	**Distance from Accident Site:**	2 Nautical Miles
Observation Time:	09:56 Local	**Direction from Accident Site:**	340°
Lowest Cloud Condition:	Scattered / 12000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 17000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	170°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.62 inches Hg	**Temperature/Dew Point:**	10°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Oakland, CA (OAK)	**Type of Flight Plan Filed:**	IFR
Destination:	Seattle, WA (SEA)	**Type of Clearance:**	IFR
Departure Time:	07:40 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	Seattle-Tacoma Inyternational KSEA	**Runway Surface Type:**	Concrete
Airport Elevation:	433 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	16R	**IFR Approach:**	Visual
Runway Length/Width:	9426 ft / 150 ft	**VFR Approach/Landing:**	Full stop

Wreckage and Impact Information

Crew Injuries:	5 None	**Aircraft Damage:**	None
Passenger Injuries:	89 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	94 None	**Latitude, Longitude:**	47.44889,-122.309448

Administrative Information

Investigator In Charge (IIC):	Anderson, Orrin
Additional Participating Persons:	Harold Hutchins; Seattle FSDO; Renton, WA
Original Publish Date:	June 8, 2005
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=58851