

NATIONAL TRANSPORTATION SAFETY BOARD

Board Meeting of June 6, 2024

(Information subject to editing)

Runway Incursion and Overflight, Southwest Airlines Flight 708, Boeing 737-700, N7827A, and Federal Express Flight 1432, Boeing 767-300, N297FE, Austin, Texas, February 4, 2023

DCA23FA149

This is a synopsis from the NTSB's report and does not include the Board's rationale for the findings, probable cause, and safety recommendations. NTSB staff is currently making final revisions to the report from which the attached findings and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing to reflect changes adopted during the Board meeting.

Executive Summary

What Happened

This incident involved Southwest Airlines (SWA) flight 708, a Boeing 737-700, and Federal Express Corporation (FedEx) flight 1432, a Boeing 767-300, which were involved in a runway incursion at Austin-Bergstrom International Airport (AUS), Austin, Texas. The local controller had cleared the SWA airplane for takeoff on runway 18L and instructed the FedEx airplane to continue its approach to the same runway. The controller was unable to see the SWA airplane on the taxiway and runway because of dense fog, and the AUS air traffic control tower (ATCT) did not have surface detection equipment to aid the controller in monitoring ground traffic.

Federal Aviation Administration (FAA) procedures required the controller to apply a 2-mile separation between the airplanes. However, when the SWA airplane lined up with the runway 18L centerline and came to a complete stop (so that the flight crew could perform an engine run-up), the FedEx airplane was 1.5 miles away. The separation between both airplanes continued to decrease until the FedEx flight crew saw the outline of the SWA airplane through the fog and began a missed approach. At that time, the FedEx airplane had just crossed the runway 18L threshold, and the SWA airplane was 1,020 ft down the runway. The airplanes were separated at their closest point by 150 to 170 ft (which was less than the 180-ft length of the FedEx Boeing 767 airplane).

The FedEx airplane continued to climb, and the SWA airplane continued to accelerate, which increased the separation between the airplanes. The SWA airplane lifted off and continued to its planned destination. The FedEx airplane circled to the left and landed on runway 18L without further incident.

What We Found

The National Transportation Safety Board (NTSB) found that the controller had an inaccurate mental model of the SWA airplane's position on the taxiway. With the low-visibility conditions on the morning of the incident and the lack of surface detection equipment in the tower, the controller had to rely on the SWA flight crew for information about the position of the airplane on the airport surface.

On the basis of his previous experience with SWA departures at AUS, the controller expected that, when a SWA pilot said that an airplane was ready to depart, the airplane would already be at the runway 18L hold-short line (a taxiway marking that indicates where an aircraft must stop to receive clearance to enter the assigned runway if that clearance was not already provided). The controller stated that this expectation was communicated to the SWA flight crew as well as the flight crews of airplanes that departed that morning before the incident. However, air traffic control (ATC) recordings provided no evidence supporting the controller's statement.

Also, the controller did not verify the SWA airplane's position on the taxiway when the flight crew requested takeoff clearance and instead assumed that the SWA airplane was already at the hold-short line. However, the SWA airplane was 550 ft away from the hold-short line at that time. By the time that the SWA airplane lined up with the runway 18L centerline, the separation between the SWA and FedEx airplanes was less than the required 2 miles.

Further, the controller's inaccurate mental model also assumed that the SWA airplane would depart from runway 18L before the FedEx airplane would arrive on the same runway. This incorrect assumption set up a hazardous situation that could have resulted in an accident. If surface detection equipment had been installed in the AUS ATCT, the controller could have tracked the position of the SWA airplane while it was on the taxiway and runway, detected the inadequate separation between the SWA and FedEx airplanes, and taken action to mitigate the situation.

We also found that, although the SWA flight crewmembers were aware that traffic (the FedEx airplane) was on short final approach to the same runway, they did not inform the controller of their intention to perform an engine run-up once the airplane entered the active runway. During the engine run-up, the SWA airplane was stopped on the runway for 19 seconds, which further decreased the separation between the departing SWA airplane and the approaching FedEx airplane. Although the SWA flight crewmembers were not required to notify the controller about their

plan to stop the airplane once on the active runway, it would have been prudent for them to do so given the traffic on short final approach.

Further, we found that the FAA's efforts to address a previous safety recommendation (A-00-66) were focused primarily on ATC-related technologies that were underway instead of a system to directly alert flight crews about potential runway incursions, as requested. We recognize the benefit of surface detection systems, such as airport surface detection equipment, model X (ASDE-X), and believe that airports without surface detection capability, including AUS, should be so equipped. Nevertheless, a flight deck alerting system would also help prevent runway incursions by providing timely notification to a flight crew about potential traffic conflicts that the crew might not see while visually scanning the outside environment.

In addition, we found that the controller did not have any recent training on low-visibility operations at the airport. The air traffic manager at the AUS ATCT explained that the tower had not conducted training on low-visibility operations during the 2 years before the incident. In addition, the controller could not recall details about the airport's surface movement guidance and control system (SMGCS) plan, which was intended to facilitate the safe movement of aircraft and vehicles on airport surfaces when visibility (specifically, the runway visual range) is less than 1,200 ft.

Last, we found that, if both airplanes had 25-hour cockpit voice recorders (CVR) installed (instead of CVRs with the currently required 2-hour recording capability), we would have been able to determine when the FedEx first officer saw the SWA airplane, how he communicated the need to go around to the FedEx captain, and other information that was not captured on ATC audio recordings.

We determined that the probable cause of this incident was the local controller's incorrect assumption that the SWA airplane would depart from the runway before the FedEx airplane arrived on the same runway, which resulted in a loss of separation between both airplanes. Contributing to the controller's incorrect assumption were

- his expectation bias regarding the SWA airplane's departure,
- his lack of situational awareness regarding the SWA airplane's position when the flight crew requested takeoff clearance, and
- the ATCT's lack of training (before the incident) on low-visibility operations.

Contributing to the incident was the SWA flight crewmembers' failure to account for the traffic that was on short final approach and to notify the controller that they would need additional time on the runway before the takeoff roll. Also contributing to the incident was the FAA's failure to require surface detection

equipment at Austin-Bergstrom International Airport and direct alerting to flight crews.

What We Recommended

As a result of this investigation, we made seven new recommendations to the FAA. We recommended that the FAA implement, at airports that are certificated under Title 14 *Code of Federal Regulations* Part 139 and are currently not equipped with ASDE-X or airport surface surveillance capability, surface detection equipment that

- tracks the movement of arriving and departing aircraft,
- determines the proximity between those aircraft, and
- provides air traffic controllers with visual and aural cues of surface movements to aid in their decision-making processes.

We recommended that the FAA brief all air traffic controllers about the circumstances of this incident, emphasizing the importance of considering the effect certain conditions might have on a pilot's ability to begin a takeoff in a timely manner, including

- low-visibility weather conditions, such as fog;
- ambient conditions (that is, the environmental conditions in the area immediately surrounding an aircraft), such as temperature; and
- surface conditions, such as ice, snow, and other precipitation.

We recommended that the FAA amend the *Aeronautical Information Manual* so that it instructs pilots, before entering an active runway with the intent to depart, to inform controllers when they need time on the runway for any reason before a takeoff roll in low-visibility conditions. We also recommended that the FAA require air traffic controllers to

- advise pilots, through direct communication and automatic terminal information system broadcasts, when visual contact with aircraft operating on taxiways and runways cannot be established or maintained and
- instruct pilots to provide accurate position reports to aid the controller in determining an aircraft's position in such conditions.

We recommended that the FAA require all airports with a SMGCS plan to review their plans and the associated letters of agreement to ensure alignment with each other and with the stakeholder duties and responsibilities described in the

related FAA advisory circular. We also recommended that the FAA direct training administrators at airports with a SMGCS plan to require initial and refresher training for all stakeholders, including air traffic controllers and airport operations personnel, on the information in the airport's plan. Further, we recommended that the FAA require training administrators at all operating ATCTs to conduct refresher training on low-visibility operations given that such conditions affect all towers.

In addition, we reiterated the following five safety recommendations that were previously issued to the FAA:

- Collaborate with aircraft and avionics manufacturers and software designers to develop the technology for a flight deck system that would provide visual and aural alerts to flight crews of traffic on a runway or taxiway and traffic on approach to land. (A-24-4)
- Require that the technology developed in response to Safety Recommendation A-24-4 be installed in all newly certificated transport-category airplanes. (A-24-5)
- Require that existing transport-category airplanes be retrofitted with the technology developed in response to Safety Recommendation A-24-4. (A-24-6)
- Require all newly manufactured airplanes that must have a cockpit voice recorder (CVR) be fitted with a CVR capable of recording the last 25 hours of audio. (A-18-30)
- Require retrofit of all cockpit voice recorders (CVR) on all airplanes required to carry both a CVR and a flight data recorder with a CVR capable of recording the last 25 hours of audio. (A-24-9)

Findings

1. None of the following were factors in this incident: (1) pilot and controller qualifications, (2) controller fatigue, (3) air traffic control tower staffing at the time of the incident, and (4) flight crew fatigue.
2. The controller's inaccurate mental model of the Southwest Airlines (SWA) airplane's position on the taxiway resulted from his (1) expectation that the SWA airplane would be at the hold-short line for runway 18L when the flight crew requested takeoff clearance and (2) failure to verify the SWA airplane's position on the taxiway at the time of the takeoff clearance request.
3. The controller's lack of training in low-visibility conditions and his expectation that the Southwest Airlines (SWA) airplane would depart quickly were factors

that led to his inaccurate mental model of the SWA airplane's position on the taxiway.

4. The controller's failure to fully understand the Southwest Airlines (SWA) airplane's position upon entering and while on the runway resulted in insufficient separation between the SWA and Federal Express airplanes.
5. The controller's incorrect assumption that the Southwest Airlines airplane would depart before the Federal Express airplane would arrive set up a hazardous situation that could have resulted in an accident. This situation could have been avoided altogether if the controller had followed established air traffic control procedures to ensure proper separation.
6. The controller could still have appropriately separated both airplanes if he had either (1) held the departing Southwest Airlines (SWA) airplane until after the arriving Federal Express (FedEx) airplane landed or (2) if the SWA airplane had already received its takeoff clearance, canceled the clearance and instructed the FedEx airplane to go around.
7. The quick reaction of the Federal Express (FedEx) first officer after seeing the Southwest Airlines (SWA) airplane and the quick response of the FedEx captain in performing a missed approach avoided a potential runway collision between the SWA and FedEx airplanes and led to the successful resolution of the loss of separation.
8. The Southwest Airlines flight crew's actions to shallow the airplane's climb in response to an advisory from the traffic alert and collision avoidance system contributed to the increased separation between the two airplanes.
9. If surface detection equipment had been installed in the air traffic control tower, the system would have allowed the controller to track the position of the Southwest Airlines (SWA) airplane while it was on the taxiway and runway, which would have provided an opportunity for the controller to detect the insufficient separation between the SWA and Federal Express airplanes and take action to mitigate the situation.
10. The implementation of a flight deck alerting system on air carrier aircraft would further improve safety at (1) airports without surface detection equipment and (2) airports with surface detection equipment if a controller were to inadequately respond to an alert in the tower.
11. Even though the Southwest Airlines flight crewmembers were not required to inform the controller about their plan to stop the airplane once on the active runway, it would have been prudent for them to do so given that they were notified about traffic on short final approach.

12. The Southwest Airlines flight crewmembers should have informed the controller of their plan to perform an engine run-up.
13. To avoid potential conflicts, it is critical for (1) controllers to consider, when providing takeoff clearance to an aircraft, whether ambient conditions might affect the timing of the takeoff roll and (2) pilots to concisely communicate pertinent aircraft position information during low-visibility conditions that might prevent a controller from seeing the aircraft.
14. Although the visibility before and at the time of the incident required the activation of the airport's Surface Movement Guidance and Control System plan, the operations supervisor's failure to implement the plan was not a factor in this incident because the local controller should have been able to appropriately manage the Southwest Airlines airplane's departure using other air traffic control procedures.
15. It is important for a Surface Movement Guidance and Control System plan and the related letter of agreement (LOA) to have aligned information given that controllers are required to comply with the provisions of all LOAs.
16. Controllers need to be sufficiently trained on their airport's Surface Movement Guidance and Control System plan so that they are able to effectively implement it when necessary.
17. Refresher training on low-visibility operations would benefit air traffic control tower personnel at all operating towers in the National Airspace System because such conditions can affect operations throughout the United States.
18. Cockpit voice recorders (CVR) with a 25-hour recording capability are necessary because valuable information continues to be overwritten on CVRs that are designed to record only 2 hours of audio data.

Probable Cause

The National Transportation Safety Board determines that the probable cause of this incident was the local controller's incorrect assumption that the Southwest Airlines (SWA) airplane would depart from the runway before the Federal Express airplane arrived on the same runway, which resulted in a loss of separation between both airplanes. Contributing to the controller's incorrect assumption were

- his expectation bias regarding the SWA airplane's departure,
- his lack of situational awareness regarding the SWA airplane's position when the flight crew requested takeoff clearance, and

- the air traffic control tower's lack of training (before the incident) on low-visibility operations.

Contributing to the incident was the SWA flight crewmembers' failure to account for the traffic that was on short final approach and to notify the controller that they would need additional time on the runway before the takeoff roll. Also contributing to the incident was the Federal Aviation Administration's failure to require surface detection equipment at Austin-Bergstrom International Airport and direct alerting for flight crews.

New Recommendations

As a result of this investigation, the National Transportation Safety Board makes the following new safety recommendations.

To the Federal Aviation Administration:

1. For airports that are certificated under Title 14 *Code of Federal Regulations* Part 139 and are currently not equipped with airport surface detection equipment, model X or airport surface surveillance capability, implement surface detection equipment that
 - tracks the movement of arriving and departing aircraft,
 - determines the proximity between those aircraft, and
 - provides air traffic controllers with visual and aural cues of surface movements to aid in their decision-making processes.
2. Require air traffic controllers to
 - advise pilots, through direct communication and automatic terminal information system broadcasts, when visual contact with aircraft operating on taxiways and runways cannot be established or maintained and
 - instruct pilots to provide accurate position reports to aid the controller in determining an aircraft's location in such conditions.
3. Brief all air traffic controllers about the circumstances of this incident, emphasizing the effect that certain conditions might have on a pilot's ability to begin a takeoff in a timely manner, including
 - low-visibility weather conditions, such as fog;
 - ambient conditions, such as temperature; and

- surface conditions, such as ice, snow, and other precipitation, as noted in Order 7110.65, Air Traffic Control, paragraph 5-8-4, Departure and Arrival.
4. Amend the *Aeronautical Information Manual* so that it instructs pilots to inform controllers, before entering an active runway with the intent to depart, when they need time on the runway for any reason before beginning the takeoff roll.
 5. Require all airports with a Surface Movement Guidance and Control System plan to ensure that their plans and the associated letters of agreement correspond with each other and the stakeholder duties and responsibilities described in Advisory Circular 120-57, Surface Movement Guidance and Control System.
 6. Direct training administrators at airports with a Surface Movement Guidance and Control System plan to require initial and annual refresher training for all stakeholders, including air traffic controllers and airport operations personnel, on the information in the airport's plan.
 7. Require training administrators at all operating air traffic control towers to conduct annual refresher training on low-visibility operations.

Previously Issued Recommendations Reiterated in This Report

The National Transportation Safety Board reiterates the following safety recommendations.

To the Federal Aviation Administration:

Collaborate with aircraft and avionics manufacturers and software designers to develop the technology for a flight deck system that would provide visual and aural alerts to flight crews of traffic on a runway or taxiway and traffic on approach to land. (A-24-4)

Require that the technology developed in response to Safety Recommendation A-24-4 be installed in all newly certificated transport-category airplanes. (A-24-5)

Require that existing transport-category airplanes be retrofitted with the technology developed in response to Safety Recommendation A-24-4 (A-24-6)

Require all newly manufactured airplanes that must have a cockpit voice recorder (CVR) be fitted with a CVR capable of recording the last 25 hours of audio. (A-18-30)

Require retrofit of all cockpit voice recorders (CVR) on all airplanes required to carry both a CVR and a flight data recorder with a CVR capable of recording the last 25 hours of audio. (A-24-9)