

RUNWAY EXCURSION SOUTHWEST AIRLINES - BOEING 737 OVERRUN

This article contains a brief summary of the full accident report, which may be viewed on the US National Transportation Safety Board (NTSB) web-site: <http://www.ntsb.gov/publictn/publictn.htm>

Factual Information

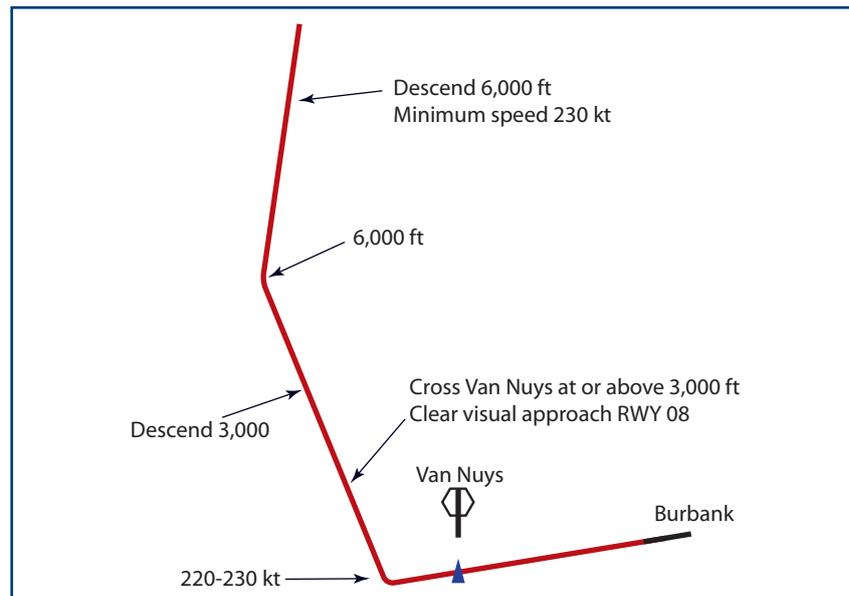
On 5th March 2000, at about 1811 local time, Southwest Airlines flight 1455, a Boeing 737-300, overran the departure end of RWY 8 after landing at Burbank Airport, California (BUR). The aircraft touched down at approximately 182 kt and about 20 seconds later, at approximately 32 kt, collided with a metal blast fence and an airport perimeter wall. The aircraft came to rest on a city street near a petrol station. 44 of the 142 persons on board were injured and the aircraft was extensively damaged.

Apparently the takeoff and en route portions of the flight to BUR were normal and uneventful. The flight crew was advised by the terminal radar approach control controller that the current ATIS was information Papa and that they should expect an ILS landing on RWY 8.

When the aircraft was about 20 miles north of the outer marker at an altitude of about 8,000 ft, the controller instructed the flight to turn left to a heading of 190° and to descend to 6,000 ft. At 18:04:02, the controller imposed a minimum speed restriction of 230 kt, apparently in order to sequence the flight between two other flights.

The first officer obtained information Papa, and informed the captain that the target airspeed for the approach would be 138 kt.

Vectoring for the approach continued with progressive descent clearances until 18:07:43 when the aircraft was cleared to 3,000 ft.



At 18:08:19 the flight was cleared to "cross Van Nuys at or above three thousand, cleared visual approach runway eight." This clearance effectively removed the speed restriction and the captain then commenced reducing speed. After the accident the captain stated that as the flight passed about 2 miles west of Van Nuys at 3,000 ft at approximately 220 kt to 230 kt, he deployed the speed brakes.

Van Nuys VOR is north of the Outer Marker and about 6nm from touchdown. At 18:08:36, as the aircraft was descending through about 3,800ft, the captain began turning to the left for the final approach.

The captain thereafter called for flaps and landing gear to be lowered progressively as he attempted to reduce the aircraft speed and establish the aircraft on the ILS glide path. The first officer stated later that the captain asked for 40° flap when

the speed was 180kt even though the limit speed for this setting is 158kt.

For the last 35 seconds of the flight GPWS alerts were continuously broadcast, first as "sink rate" and later switching to "whoop, whoop, pull up."

The aircraft touched down with flaps extended to 30° at about 182kt. Thrusts reversers were deployed about 4 seconds later and the captain braked hard before the aircraft had decelerated to 80kt. As the aircraft neared the end of the runway, the captain initiated a right turn.

The aircraft departed the right side of the runway, penetrated a metal blast fence and an airport perimeter wall, and came to a stop on a city street off the airport property. An emergency evacuation ensued, and all crewmembers and passengers successfully exited the aircraft.

Analysis

The speed throughout the approach was high and was 182kt at touch down, compared with a target speed of 138kt. The flight path angle during the approach was 7°, more than twice the standard flight path angle of 3°. The first officer did not make any altitude callouts nor did he draw the captain's attention to the high speed and sink rate, as required by Southwest Airlines SOPs. If he had made these callouts, both he and the captain might have been further alerted to the fact that the aircraft's airspeed and sink rate were excessive.

Because of the high speed and sink rate the approach was unstabilised and the aircraft was not in the proper position to land; therefore, in accordance with Southwest Airlines SOPs, a go-around manoeuvre should have been performed. Furthermore, the Flight Operations Manual indicates that touchdown should occur between 1,000ft and 1,500ft from the landing threshold. The aircraft landed about 2,150ft from the threshold, further indicating that it was not in the proper position to land.

At 1804:02 the controller instructed the flight to "maintain two thirty or greater 'till advised". At 1808:19, the controller issued a clearance to commence the approach, thereby cancelling the earlier speed assignment. At 1807:43, traffic conditions no longer warranted the speed limitation; cancelling the speed limitation then would have permitted the captain to begin to reduce his speed about 37 seconds sooner, thereby giving him more time to properly execute his approach to land.

The flight was given vectors that resulted in interception of the final approach course about 8 nm west of the runway threshold. This vector put the aircraft in an unfavourable position for final approach, complicated the flight crew's approach planning and execution, and contributed to the unstabilised approach.

Further, the controller's instruction to "cross Van Nuys at or above three thousand" was ambiguous because the Van Nuys VOR is not on the aircraft's flight path. This ambiguous clearance may have caused the flight crew to delay descent longer than necessary.

In summary, the NTSB concluded that the actions of the controller positioned the aircraft too fast, too high, and too close to the runway threshold to leave any safe options other than a go-around manoeuvre.

The NTSB determines the probable causes of this accident as follows:

"... the flight crew's excessive airspeed and flight path angle during the approach and landing and its failure to abort the approach when stabilized approach criteria were not met.

Contributing to the accident was the controller's positioning of the aircraft in such a manner as to leave no safe options for the flight crew other than a go-around manoeuvre."

Lessons Learned

RUNWAY EXCURSION - From several safety occurrences we recommend:

- Controllers must recognise and understand the pilots' working environments and constraints;
- Controllers have a primary responsibility for safety, therefore the requirement to position aircraft so that a safe approach and landing is possible is overriding;
- Altitude or speed restrictions should be clear and unambiguous and must be removed as soon as they cease to be necessary.