NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

October 13, 2009

ADDENDUM 4 AND CORRECTIONS

TO THE

OPERATIONS / HUMAN PERFORMANCE

GROUP CHAIRMEN'S FACTUAL REPORT

DCA09MA021

Make the following deletion (strikethrough text) and additions (underlined text) in paragraph 7 of section *1.1. History of Flight.*

The captain was the flying pilot and he began a reduced-power takeoff. He first pushed the thrust levers up to achieve 40 percent N_1, then increased power to 70 percent N_1. He noticed a difference in the thrust being generated by the two engines, but the two engines matched as he increased N_1 to 90 percent. After verifying this, he pressed the TOGA button and called out, "check power." The first officer responded that thrust was set at 90.9% N_1. The flight data recorder indicated that the captain applied a left control wheel correction, applied slight back ~~forward~~ pressure to the yoke, and used variable right rudder to keep the airplane aligned with the runway centerline. He recalled that it felt at first like a "normal crosswind takeoff."

Insert the following paragraph at the end of section *1.6.3.1. CAL B-737 Crosswind Guidelines*.

Continental Airlines established a dry runway crosswind takeoff guideline of 33 knots for its B-737 fleet based on the maximum demonstrated crosswind of 33 knots listed in the Aviation Partners Boeing publication *Airplane Flight Manual Supplement for the Boeing 737-800-3 with Aviation Partners Boeing Blended Winglets*.

Make the following deletion (strikethrough text) and additions (underlined text) and add the following table in section *1.16.1.2. Strength of Crosswind and Subjective Difficulty of Takeoff*.

The flying pilot was briefed in advance on the wind condition for each takeoff. Each takeoff began with the airplane fully stopped at the beginning of the runway. A monitoring pilot located in the right seat made standard airspeed callouts. An observer seated behind the two pilots recorded the flying pilot's subjective difficulty rating after each takeoff was completed.

~~Participants provided a subjective characterization of the difficulty of the takeoffs using a 5-point rating scale ranging from 1 ("very easy") to 5 ("very difficult"). The majority of participants judged the 0-knot crosswind condition as very easy, the 25-knot condition as neither easy nor difficult, and the 35-knot and 30-gusting-to-40-knot conditions as slightly difficult.~~

After each takeoff, the flying pilot rated the subjective difficulty of the maneuver on a scale of 1 to 7, with 1 being "very easy," 2 being "moderately easy", 3 being "slightly easy", 4 being "neither difficult nor easy", 5 being "slightly difficult", 6 being "moderately difficult", and 7 being "very difficult". Ratings provided by the group's five ATP-rated pilots are displayed in Table 14.

Table 14.
Subjective difficulty ratings of takeoffs conducted in four different crosswind conditions.

Participant	0-knot cross-wind	25-knot cross-wind	35-knot cross-wing	30-knot gusting to 40-knot cross-wind
1	1	4	5	6
2	1	2	5	5
3	1	3	5	4
4	1	5	5	5
5	1	4	5	5
Median	1	4	5	5

Add a new footnote at the bottom of the first paragraph in section *1.16.1. Observational Study in a CAL B-737-500 Training Simulator*.

New Footnote: After the observational study was completed, investigators received information from Continental Airlines indicating that the company's B-737-500 training simulator was not programmed to model gust effects on the ground or at altitudes below 15 meters above ground level.

Add the underlined material to footnote 38 in section *1.16.2. Operational Information Provided by Continental Airlines*.

Footnote 38: Crosswind component was calculated using flight parameters recorded 7 seconds after takeoff and the following formula: CROSSWIND = (WIND SPEED) * sin {(HEADING – (WIND DIRECTION)) * pi/180}. Calculated crosswind component was highly correlated with average rudder correction 15 to 3 seconds before liftoff (r = .81). Takeoffs for all CAL airplanes, except the B-737-300 were included in this analysis. Because the crosswind calculation occurs 7 seconds after liftoff, the expectation is that the pilot will not be using rudder. Application of rudder would generate sideslip and significant sideslip would result in inaccuracy of the calculated winds.

Change the numbering of Table 14, Continental Airlines Fleet Composition at the Time of the Accident, to Table 15.