NATIONAL TRANSPORTATION SAFETY BOARD
Public Meeting of January 24, 2006
(Information subject to editing)

Report of Aviation Accident
Collision with Trees and Crash Short of Runway, Corporate Airlines Flight 5966, British Aerospace BAE-J3201, N875JX, Kirksville, Missouri, October 19, 2004
NTSB/AAR-06/01

This is a synopsis from the Safety Board's report and does not include the Board's rationale for the conclusions, probable cause, and safety recommendations. Safety Board staff is currently making final revisions to the report from which the attached conclusions 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.

EXECUTIVE SUMMARY

On October 19, 2004, about 1937 central daylight time, Corporate Airlines (doing business as American Connection) flight 5966, a BAE Systems BAE-J3201, N875JX, struck trees on final approach and crashed short of runway 36 at the Kirksville Regional Airport (IRK), Kirksville, Missouri. The flight was operating under the provisions of 14 *Code of Federal Regulations*Part 121 as a scheduled passenger flight from Lambert-St. Louis International Airport, in St. Louis, Missouri, to IRK. The captain, first officer, and 11 of the 13 passengers were fatally injured, and 2 passengers received serious injuries. The airplane was destroyed by impact and a post-impact fire. Night instrument meteorological conditions (IMC) prevailed at the time of the accident, and the flight operated on an instrument flight rules flight plan.

The National Transportation Safety Board determines that the probable cause of the accident was the pilots' failure to follow established procedures and properly conduct a non-precision instrument approach at night in instrument meteorological conditions (IMC), including their descent below the minimum descent altitude (MDA) before required visual cues were available (which continued un-moderated until the airplane struck the trees) and their failure to adhere to the established division of duties between the flying and non-flying (monitoring) pilot.

Contributing to the accident was the pilots' failure to make standard callouts and the current Federal Aviation Regulations that allow pilots to descend below the MDA into a region in which safe obstacle clearance is not assured based upon seeing only the airport approach lights. The pilots' unprofessional behavior during the flight and their fatigue likely contributed to their degraded performance.

The safety issues in this report focus on operational and human factors issues, including the pilots' professionalism and sterile cockpit procedures, non-precision instrument approach procedures, flight and duty time regulations, fatigue, and flight data/image recorder requirements.

CONCLUSIONS

1. The captain and first officer were properly certificated and qualified in accordance with, and had received the training and rest time prescribed by, Federal regulations and company requirements. The flight crewmembers possessed valid and current medical certificates appropriate for 14 *Code of Federal Regulations* Part 121 flight operations.

2. The accident airplane was properly certificated and maintained and was equipped and dispatched in

accordance with applicable regulations and industry practices. There was no evidence of any preexisting powerplant, system, or structural failure.

3. The accident airplane's cargo and its loading were not factors in the accident.

4. Although the weather did not cause this accident, the low ceiling and reduced visibility at Kirksville Regional Airport made the non-precision approach more challenging.

5. Corporate Airlines' policies, procedures, and training were consistent with industry standards.

6. Air traffic control was not a factor in the accident.

7. The emergency response did not adversely affect the survivability of this accident.

8. An enhanced ground proximity warning system (required by Federal regulation since March 29, 2005) would have provided the pilots with a "too low terrain" alert in sufficient time to avoid collision with the trees.

9. The pilots failed to follow established procedures to effectively monitor the airplane's descent rate and height above terrain during the later stages of the approach and relied too much on minimal external visual cues. Although descent rate and altitude information were readily available through cockpit instruments, both pilots were largely preoccupied with looking for the approach lights.

10. The pilots' nonessential conversation below 10,000 feet mean sea level (msl) was contrary to established sterile cockpit regulations and reflected a demeanor and cockpit environment that fostered deviation from established standard procedures, crew resource management disciplines, division of labor practices, and professionalism, reducing the margin of safety well below acceptable limits during the accident approach and likely contributing to the pilots' degraded performance.

11. Compliance with sterile cockpit rules may have resulted in an increased focus on standard procedures and professionalism during the accident flight.
12. The captain should have, but did not, arrest the airplane's rapid descent when they reached the MDA, and the first officer should have, but did not, challenge the captain's descent below the minimum descent altitude.

13. The use of a constant-angle-of-descent approach technique, with its resultant stabilized, moderate rate-of-descent flightpath, and obstacle clearance, would have better positioned the accident airplane for a successful approach and landing.

14. Current regulations permitting pilots to descend below the MDA into a region where obstacle clearance is not assured may result in reduced margins of safety for non-precision approaches, especially in conditions of low ceilings, reduced visibility, and/or at night. Further, these regulations can have the unintended effect of encouraging some pilots to descend below the MDA in an attempt to acquire visual cues that will permit them to continue the approach, as occurred in this case.

15. On the basis of the less than optimal overnight rest time available, the early reporting time for duty, the length of the duty day, the number of flight legs, the demanding conditions (non-precision instrument approaches flown manually in conditions of low ceilings and reduced visibilities) encountered during the long duty day (and the two previous days), it is likely that fatigue contributed to the pilots' degraded performance and decisionmaking.

16. Existing Federal Aviation Administration pilot duty regulations do not reflect recent research on pilot fatigue and sleep issues, increasing the possibility that pilots will fly in a fatigued condition.

17. Providing pilots with additional fatigue-related training, such as that being developed by the

Department of Transportation Operator Fatigue Management Program, may increase their awareness and use of fatigue avoidance techniques and thus improve safety margins.

18. Capturing the maximum-recorded data possible is necessary for a more effective reconstruction of the events that lead to accidents and the issuance of more timely safety recommendations to prevent similar accidents from recurring.

19. While the accident aircraft's 1,200 feet per minute (fpm) rate of descent was consistent with company procedure, it varied from current FAA guidance that recommends a descent rate of no more than 1,000 fpm under 1,000 feet above ground level (agl).

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the accident was the pilots' failure to follow established procedures and properly conduct a non-precision instrument approach at night in IMC, including their descent below the MDA before required visual cues were available (which continued un-moderated until the airplane struck the trees) and their failure to adhere to the established division of duties between the flying and non-flying (monitoring) pilot.

Contributing to the accident were the pilots' failure to make standard callouts and the current Federal Aviation Regulations that allow pilots to descend below the MDA into a region in which safe obstacle clearance is not assured based upon seeing only the airport approach lights. The pilots' failure to establish and maintain a professional demeanor during the flight and their fatigue likely contributed to their degraded performance.

SAFETY RECOMMENDATIONS

As a result of the investigation of the Corporate Airlines flight 5966 accident, the National Transportation Safety Board makes the following recommendations:

To the Federal Aviation Administration:

1. Direct the principal operations inspectors of all 14 *Code of Federal Regulations* Part 121 and 135 operators to reemphasize the importance of strict compliance with the sterile cockpit rule. (A-06-XX)

2. Require all 14 *Code of Federal Regulations* Part 121 and 135 operators to incorporate the constant-angle-of-descent technique into their non-precision approach procedures and to emphasize the preference for that technique where practicable. (A-06-XX)

3. Revise applicable 14 *Code of Federal Regulations* Part 121 and 135 regulations to prohibit pilots from descending below the minimum descent altitude during non-precision instrument approaches unless conditions allow for clear visual identification of all obstacles and terrain along the approach path or vertical guidance to the runway is available and being used. (A-06-XX)

4. Modify and simplify the flight crew hours-of-service regulations to take into consideration factors such as length of duty day, starting time, workload, and other factors shown by recent research, scientific evidence, and current industry experience to affect crew alertness. (A-06-XX) (This recommendation supersedes Safety Recommendation A-99-45.)

5. Require all 14 *Code of Federal Regulations* Part 121 and 135 operators to incorporate fatigue-related information similar to that being developed by the Department of Transportation Operator Fatigue Management Program into their initial and recurrent pilot training programs; such training should address the detrimental effects of fatigue and include strategies for avoiding fatigue and countering its effects. (A-06-XX)

PREVIOUSLY ISSUED SAFETY RECOMMENDATIONS

To the Federal Aviation Administration:

1. Require that all aircraft operated under Title 14 *Code of Federal Regulations* Part 121, 125, or 135 and currently required to be equipped with a cockpit voice recorder (CVR) and flight data recorder (FDR) be retrofitted by January 1, 2005, with a crash-protected cockpit image recording system. The cockpit image recorder system should have a 2-hour recording duration, as a minimum, and be capable of recording, in color, a view of the entire cockpit including each control position and each action (such as display selections or system activations) taken by people in the cockpit. The recording of these video images should be at a frame rate and resolution sufficient for capturing such actions. The cockpit image recorder should be mounted in the aft portion of the aircraft for maximum survivability and should be equipped with an independent auxiliary power supply that automatically engages and provides 10 minutes of operation whenever aircraft power to the cockpit image recorder and associated cockpit camera system ceases, either by normal shutdown or by a loss of power to the bus. The circuit breaker for the cockpit image recorder system, as well as the circuit breakers for the CVR and the digital FDR, should not be accessible to the flight crew during flight. (A-00-30)

2. Require all turbine-powered, nonexperimental, nonrestricted-category aircraft that are manufactured prior to January 1, 2007, that are not equipped with a flight data recorder, and that are operating under 14 *Code of Federal Regulations* Parts 135 and 121 or that are being used full-time or part-time for commercial or corporate purposes under Part 91 to be retrofitted with a crash-protected image recording system by January 1, 2010. (A-03-65)