

# **NATIONAL TRANSPORTATION SAFETY BOARD**

**Public Meeting of June 8, 2004**

**(Information subject to editing)**

## **Report of Aviation Accident**

**Collision with Trees on Final Approach**

**FedEx Flight 1478, Boeing 727-232, N497FE**

**Tallahassee, Florida, July 26, 2002**

**NTSB/AAR-04/02**

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 July 26, 2002, about 0537 eastern daylight time, Federal Express flight 1478, a Boeing 727-232F, N497FE, struck trees on short final approach and crashed short of runway 9 at the Tallahassee Regional Airport (TLH), Tallahassee, Florida. The flight was operating under the provisions of 14 *Code of Federal Regulations* Part 121 as a scheduled cargo flight from Memphis International Airport, in Memphis, Tennessee to TLH. The captain, first officer, and flight engineer were seriously injured, and the airplane was destroyed by impact and resulting fire. Night visual meteorological conditions prevailed for the flight, which operated on an instrument flight rules flight plan.

The safety issues in this report focus on flight crew performance, flight crew decision-making, pilot fatigue, and Federal Aviation Administration (FAA) certification of pilot's with color vision deficiencies. Safety recommendations concerning these issues are addressed to the FAA.

## **CONCLUSIONS**

1. The captain, first officer, and flight engineer possessed valid airman and medical certificates.
2. The captain, first officer, and flight engineer had received the training and off-duty time prescribed by Federal regulations and company requirements.

3. The accident airplane and its cargo were not factors in the accident.
4. Weather and air traffic control were not factors in the accident.
5. The airport lighting systems, including the precision approach path indicator lights, were not a factor in the accident.
6. The accident approach was not stabilized as the airplane descended through 500 feet above ground level, and the pilots should have detected this and performed a go-around.
7. The approach to runway 9 at Tallahassee Regional Airport (which was flown over unlighted terrain and in night visual conditions) resulted in black hole conditions, which likely contributed to the flight crew's failure to properly perform the approach.
8. Precision approach path indicator lights, such as those installed at runway 9 at Tallahassee Regional Airport, are a recognized countermeasure for use in black hole conditions and should have been, but were not, effectively used to maintain an appropriate glidepath by the first officer (who was the flying pilot) or by the captain and flight engineer (who, under the principles of basic crew coordination, were in a position to receive this information and initiate a corrective response).
9. The captain was likely impaired by fatigue and this impairment contributed to his degraded performance (especially in the areas of crew coordination and monitoring) during the approach to Tallahassee Regional Airport.
10. The first officer's reported difficulty adapting to his schedule and frequently changing sleep cycles were conducive to the development of fatigue impairment that contributed to his degraded performance during the approach to Tallahassee Regional Airport; however, there were also other factors affecting the first officer's performance (for example, his color vision deficiency).
11. It is possible that the flight engineer was impaired by fatigue at the time of the accident; however, it is also possible that the flight engineer's poor monitoring of the late stages of the approach was the result of his workload during the somewhat rushed approach, the presumption that the two forward-facing flight crewmembers were adequately monitoring the approach, or some combination of factors.
12. The circumstances of this accident, in part, demonstrate the continuing need for fatigue management efforts similar to those being developed by the Department of Transportation Operator Fatigue Management Program in the aviation industry.

13. The first officer suffered from a severe color vision deficiency that made it difficult for him to correctly identify the color of the precision approach path indicator signal during the below-glidepath, nighttime, visual approach to runway 9 at Tallahassee Regional Airport.
14. Existing aviation medical certification standards for color vision and use of related screening tests may not ensure detection of color vision deficiencies that can be detrimental to safety; it is possible that in some emergency situations, the speed of color recognition may assume an importance that is not currently reflected in the standards.
15. One or more of the color vision screening tests currently approved for use in the aviation industry (for example, the Farnsworth Lantern screening test) are not adequate; these tests should be identified and their use discontinued.
16. The circumstances of this accident support the recent increase in emphasis on crew monitoring reflected in recent initiatives by the Federal Aviation Administration and aviation industry.

## **PROBABLE CAUSE**

The National Transportation Safety Board determines that the probable cause of the accident was the captain's and first officer's failure to establish and maintain a proper glidepath during the night visual approach to landing. Contributing to the accident was a combination of the captain's and first officer's fatigue, the captain's and first officer's failure to adhere to company flight procedures, the captain's and flight engineer's failure to monitor the approach, and the first officer's color vision deficiency.

## **SAFETY RECOMMENDATIONS**

As a result of the investigation of the FedEx flight 1478 accident, the National Transportation Safety Board makes the following recommendations:

### **To the Federal Aviation Administration:**

1. Conduct research to determine the effectiveness of each of the current Federal Aviation Administration-approved color vision test protocols (including the color signal light test) at effectively screening out pilot applicants with color vision deficiencies that could impair their ability to perform color-related critical aviation tasks including (but not limited to) correct interpretation of glideslope information and in-cockpit displays that use color to convey information. The research should take into account the time typically available to

perform each task, particularly under emergency conditions, and the potential effect of mild hypoxia (as might occur at typical cabin altitudes) on color vision deficiencies. (A-04-XX)

2. Based on the results of the study requested in recommendation #1, develop a standard battery of tests to be performed at least once on each applicant for a Class 1 or 2 medical certificate that would prevent applicants with color vision deficiencies that could impair their ability to perform color-related critical aviation tasks from being certificated without limitations. (A-04-XX)