National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: December 22, 2011

In reply refer to: R-11-4

The Honorable Carlos A. Gimenez
Mayor, Miami-Dade County
Stephen P. Clark Center
111 NW 1st Street
Miami, Florida 33128

The National Transportation Safety Board (NTSB) is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendations in this letter. The NTSB is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

The recommendation is derived from the NTSB's investigation of a November 28, 2008, accident in which a three-car automated people mover (APM) train operating at Miami International Airport failed to stop at the passenger platform and struck a terminal wall. As a result of this investigation, the NTSB has issued five safety recommendations, one of which is addressed to Miami-Dade County. Information supporting this recommendation is discussed below. The NTSB would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

About 4:44 p.m., eastern standard time, on November 28, 2008, a three-car APM train (referred to in the report as the south train) operating along a fixed guideway[1] on E Concourse at Miami International Airport failed to stop at the passenger platform and struck a wall at the end of the guideway. Although a maintenance technician was monitoring train operations from the lead car of the train when the accident occurred, the train was operating in fully automatic mode without a human operator. The maintenance technician and five passengers on board the train

[1] A *rail fixed guideway system* is defined by Title 49 *Code of Federal Regulations* Part 659 as any light, heavy, or rapid rail system, monorail, inclined plane, funicular, trolley, or automated guideway.

were injured in the accident. One person on the passenger platform also required medical attention.[2]

The National Transportation Safety Board determined that the probable cause of this accident was the installation by Johnson Controls, Inc., maintenance technicians of a jumper wire that prevented the overspeed/overshoot system from activating to stop the train when the crystal within the primary program stop module failed. Contributing to the accident were (1) the failure of Johnson Controls, Inc., to provide its maintenance technicians with specific procedures regarding the potential disabling of vital train control systems during passenger operations, (2) ineffective safety oversight by the Miami-Dade Aviation Department, (3) lack of adequate safety oversight of such systems by the state of Florida, and (4) lack of authority by the U.S. Department of Transportation to provide adequate safety oversight of such systems.

The maintenance contractor for the Miami airport APM system was Johnson Controls, Inc. (JCI). The investigation revealed that JCI maintenance technicians, while troubleshooting ongoing problems with the automatic train control system and in order to keep the trains in service, had installed a jumper wire in the train control compartment of the south train. The NTSB reviewed the system schematics and determined that this jumper wire bypassed the overspeed/overshoot system relay. Bypassing the relay took the fail-safe component of the system "out of the loop" and placed sole responsibility for safely stopping the train on the nonvital program stop system—with no backup system in place if that system failed. Postaccident examination of train control and train braking system components revealed no evidence to suggest that the overspeed/overshoot system would not have worked as designed on the day of the accident. The NTSB concluded that, had it not been bypassed by placement of a jumper wire as part of a troubleshooting process, the overspeed/overshoot relay on board the south train would have functioned as designed when the program stop module failed, and the overspeed/overshoot system would have intervened to safely stop the train and prevent the accident.

Safety oversight of the APM system at Miami International Airport should have been provided by, at a minimum, the Miami-Dade Aviation Department (MDAD) and the state of Florida. The NTSB's investigation revealed, however, that neither entity was routinely providing detailed oversight with regard to safety issues.

The MDAD project manager/superintendent of contracts and construction was responsible for monitoring the safety and maintenance of the system, while the MDAD Facilities Maintenance Division was responsible for oversight of the APM system contractor. Those oversight roles were largely carried out by notifying JCI maintenance technicians when a train malfunctioned and relying on those maintenance technicians to take the actions necessary to return the trains to service.

JCI had taken over as maintenance contractor for the system (replacing the previous maintenance contractor, Bombardier—Automated People Movers) about 10 months before the

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[2] See *Miami International Airport, Automated People Mover Train Collision with Passenger Terminal Wall, Miami, Florida, November 28, 2008,* Railroad Accident Report NTSB/RAR-11/01 (Washington, DC: National Transportation Safety Board, 2011) on the NTSB website at <http://www.ntsb.gov>.

accident. Based on maintenance records and employee interviews, the trains during that period had exhibited frequent and recurring problems that were addressed on an ad hoc basis. At no point did MDAD management evaluate the various safety risks inherent in the APM system and develop methods of managing and minimizing those risks. Nor did it seek to enforce the contract provision requiring that trains be taken out of service in the event of a malfunction that significantly degraded passenger safety.

Risk to passengers rose to unacceptable levels when trains were allowed to operate in passenger service with the overspeed/overshoot system bypassed by a jumper wire. However, the fact that the vital overspeed/overshoot system was being bypassed on some trains in passenger service was apparently not known by MDAD management, indicating a failure of the agency to fulfill its proper oversight role.

The NTSB concluded that the state of Florida and MDAD failed to exercise safety oversight of the Miami International Airport APM system, which resulted in trains being allowed to operate in regular passenger service with a vital safety system disabled.

The investigation also revealed other instances in which MDAD safety oversight of JCI was lacking or ineffective. For example, JCI managers told investigators that no procedures were available for testing the service and emergency braking systems on the APM trains. NTSB investigators discovered, however, that such procedures did exist and were published in the maintenance manuals for the equipment. Nonetheless, brake tests were not being routinely conducted.

Although it was found to be working properly at the time of the accident, the vital overspeed/overshoot relay that had been bypassed by the jumper wire had not been inspected in almost 7 years. JCI was unable to provide documentation regarding relay test procedures for the overspeed/overshoot relay or any other vital relays used in the APM system. Bombardier procedures required that such relays be inspected on a 4-year cycle, which is consistent with the maintenance standards within the freight and transit railroad industries. MDAD had not verified that either JCI or Bombardier conducted brake tests or tested vital relays as recommended by the equipment manufacturers.

The Florida Department of Transportation (Florida DOT) provides safety oversight of six fixed guideway transportation systems within the state, including APM systems at the Orlando and Tampa airports. The Florida DOT does not provide safety oversight of the APM system at Miami International Airport. In 1988, the Florida DOT asked that MDAD develop a system safety program plan for the Miami airport APM. Although MDAD acknowledged that the state partly financed the system, it declined to develop a safety plan stating that the system predated the state statute requiring such oversight.

External safety oversight of public transportation systems is critical to identifying and correcting systemic safety risks that may not be readily apparent or may not be effectively addressed by the operator or transit agency. The NTSB believes that higher level oversight of fixed guideway transportation systems, such as the Miami airport APM system, is necessary to help promote effective risk analysis and safety management of these systems and will lead to safer travel.

Therefore, the National Transportation Safety Board makes the following safety recommendation to Miami-Dade County:

> Develop and implement a system safety program plan to identify and manage safety hazards on all fixed guideway transportation systems within your jurisdiction. (R-11-4)

The NTSB also issued safety recommendations to the U.S. Department of Transportation, to the 50 states and the District of Columbia, and to Johnson Controls, Inc. Additionally, the report reiterated a previously issued recommendation to the U.S. Department of Transportation.

In response to the recommendation in this letter, please refer to Safety Recommendation R-11-4. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our secure mailbox. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman HERSMAN, Vice Chairman HART, and Members SUMWALT, ROSEKIND, and WEENER concurred in this recommendation. Vice Chairman HART filed a concurring statement, which is attached to the railroad accident report for this accident.

[Original Signed]

By: Deborah A.P. Hersman
Chairman