National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: June 6, 2006

In reply refer to: R-06-8 and -9

Mr. James R. Young
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The National Transportation Safety Board 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 Safety Board is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

The recommendations address Union Pacific Railroad (UP) programs related to the installation, maintenance, and operation of yard power-assisted switch machines. The recommendations are derived from the Safety Board's investigation of the December 7, 2003, accident in which a railroad switching foreman was struck by a locomotive at the UP's East Yard in San Antonio, Texas. As a result of this investigation, the Safety Board has issued two recommendations to the UP. Information supporting these recommendations is provided below.

On December 7, 2003, about 12:12 a.m., central standard time, a UP switching foreman was struck and killed by two locomotives at the UP's East Yard in San Antonio, Texas. The two locomotives were operated as a single unit under the foreman's control. He was operating the locomotives from the ground using a remote control transmitter. He usually had a helper. However, the night the accident occurred, the helper position was not filled because of a crew dispatch problem, so the foreman worked alone.[1] He was moving the locomotives from track 32 to train yard track 3, where he was assigned to switch[2] 44 railroad cars. When the accident occurred, the locomotives were traveling about 11 mph and were moving back over the track they had just traversed rather than over the route leading to the destination (train yard track 3).

[1] For additional information, see National Transportation Safety Board, *Railroad Switching Foreman Struck by Locomotives, San Antonio, Texas, December 7, 2003*, Railroad Accident Brief NTSB/RAB-06/02 (Washington, DC: NTSB, 2006).

[2] *Switch* means to move cars to other tracks based on their destinations.

The National Transportation Safety Board determines that the probable cause of the December 7, 2003, yard accident in San Antonio, Texas, was the foreman's inattentiveness to the location of the locomotives and the switch position and the lack of adequate oversight by the Union Pacific Railroad of power-assisted switch installation, maintenance, and operations at its East Yard.

During the course of the investigation, it became apparent that there had been wiring errors when the power-assisted switch machines were originally installed at San Antonio East Yard, about 2 1/2 years before the accident. Before the accident, 4 of the 10 switch boxes at the west end of East Yard were wired so that the electrical disconnect switch did not cut off the electrical power from the switch machine, which would have created a safety hazard for personnel servicing the switches and for mechanical crews working on, under, or between railroad equipment. During the postaccident inspection, a second defect was discovered involving 10-gauge multistrand wire that was inserted into the terminal blocks on all 10 power-assisted switch machines at the west end of East Yard. The manufacturer's specification requires 14-gauge solid wire, which is smaller than 10-gauge wire and has different clamping and conducting properties. The improper wire was used during the original switch installation. The manufacturer advised the Safety Board that an incorrectly sized wire often results in intermittent electrical contact. A few days after the accident, the UP signal manager for San Antonio was asked why a 10-gauge wire had been used. He responded that it was a heavier wire and said, "That is better." When he was again asked about the UP policy on wire size, he indicated that the policy was to use the specified wire size. When the wire size is not specified, he said, "we go to the manufacturer's specification and use the wire size the manufacturer recommends."

The signal manager stated that based on his postaccident inspection of the switch he believed that the 10-gauge wire caused the loss of power because the spring was not holding this size wire correctly in the terminal block. He told Safety Board investigators that when he made this discovery he re-stripped the wire end and "plugged" the incorrectly sized wire back into the terminal block. Later, after other managers reported problems, the entire switch machine was removed and replaced with another machine that had the correct size wire. This sequence of events indicates that the official UP policy on using the manufacturer-recommended wire size was not well understood by the UP managers and employees. Had UP personnel understood and complied with the railroad's policy on wire size, it is unlikely that intermittent power interruptions resulting from incorrect wire size would have occurred.

After the installation of the power-assisted switch machines at East Yard, no written operating instructions were issued to switchmen and other employees. Investigators observed that the switchmen at East Yard often would manually disconnect the electrical power to this type of switch machine once the switch points had moved to the desired position. Testing showed that removing power after the points had moved and before the machine had completed its cycle resulted in the machine not running through a full cycle on the next activation. The adoption of the power removal procedure by the switchmen at East Yard increased the probability that the pump would run, but the switch points would not move, on the next cycle. Had UP personnel operating the power-assisted switch machines understood the machine's unique operating characteristics, such as auto-reverse and the potential undesired results of midcycle power interruption, it is unlikely that the informal practice of removing power would have become so

common. Further, the interruption of electrical power after switch activation, either because of an improperly sized wire or because of using the power disconnect before the machine had completed a previous cycle, likely resulted in a false audible cue to the foreman that the switch was moving to the commanded position.

Therefore, the National Transportation Safety Board makes the following safety recommendations to the Union Pacific Railroad:

> Issue written guidance that emphasizes the importance of using specified wire requirements to the employees responsible for installing and maintaining power-assisted switch machines. (R-06-8)
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> Issue written guidance that emphasizes the proper use of the equipment to employees who use power-assisted switch machines. Include any unique operating characteristics, such as auto-reverse, the potential undesired results of midcycle power interruption, and "lock-out" procedures, and require employees to demonstrate an understanding of the guidance. (R-06-9)

The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendations. The Safety Board also issued one recommendation to the Federal Railroad Administration. In your response to the recommendations in this letter, please refer to Safety Recommendations R-06-8 and -9. If you need additional information, you may call (202) 314-6177.

Acting Chairman ROSENKER and Members ENGLEMAN CONNERS, HERSMAN, and HIGGINS concurred in these recommendations. Member Deborah A. P. Hersman filed a concurring statement that is included in the Board's final brief on this accident.

[Original Signed]

By: Mark V. Rosenker
Acting Chairman