

AI-4
R-408

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: MAY 25 1982

Forwarded to:

Mr. John Simpson
President
New York City Transit Authority
370 Jay Street
Brooklyn, New York 11202

SAFETY RECOMMENDATION(S)

R-82-35 through -42

About 1:45 p.m. on July 3, 1981, New York City Transit Authority (NYCTA) train 142NL struck the rear of NYCTA train 132NL north of the Sutter Avenue Station in Brooklyn, New York. The collision was preceded by a signal failure in the area at 11:12 a.m. which the NYCTA command center was not aware of. Trains were continually dispatched into the failure area at other than scheduled times, without being warned about the inoperative signals, until 1:37 p.m. During this time, signal department employees were flagging trains by the inoperative signals while attempting to determine the cause of the failure. The motorman of train 142NL was killed, and 140 passengers and crewmembers on the trains were injured. Estimated damage was \$543,200. 1/

The NYCTA uses two different types of train control systems with an automatic block signal system to direct the movement of trains. One system is the original equipment, and the other system is being used where modernization work has been completed. The system on the portion of the New Lots line where the accident occurred has the original Interborough Rapid Transit (IRT) line train control system constructed in 1912. The signals are a three-color light type displaying green, which indicates proceed; yellow, which indicates approach; and red, which indicates stop. The train control is an automatic train stop system that makes use of a trip arm located outside the rail adjacent to the signal. When a signal is red, indicating stop, the trip arm raises. If a train fails to stop at a red signal, its lead car strikes the raised trip arm of the signal system and the train's brakes apply automatically in emergency. The trip arms of both train control systems are equipped with hooks that, when applied, prevent the trip arm from raising when it would otherwise raise. In the accident area, each of the trip arms also had a rope attached which, when tied, prevents the trip arm from raising. Tying the trip arm down insures that the trip arm will stay down even if vibration dislodges the trip arm hook.

Train 142NL was flagged through the red signals at Saratoga Avenue by an employee of the signal department, and because the trip arm on the north end of the station was tied down and because of the dark signals from the Saratoga Avenue Station to the point of collision, it was not necessary for the motorman to stop the train at each dark signal to cause the trip arm to fall into the nontripping position. In fact, the motorman may have believed that the block ahead was clear because the trip arm was in the down position and the signal at the north end of the Sutter Avenue Station appeared to be green. He also may have thought that the trip arm had been put down by signal department employees to indicate that the track ahead was clear. Since none of the operating employees involved

1/ For more detailed information read Railroad Accident Report—"Rear-End Collision of New York City Transit Authority Subway Trains 142NL and 132NL, Brooklyn, New York, July 3, 1981" (NTSB-RAR-82-2).

in this accident, including command center personnel, understood that the trip arms did not rise automatically to the up or stop position when signals failed in this area, it is doubtful that the motorman of train 142NL understood that fact. It is also unlikely that he heard the communications from trains 122NL and 132NL to the command center concerning being stopped because of dark signals, since he would have been boarding his train at the New Lots Avenue Station about that time. He may have heard only the radio transmission from the command center trainmaster to key by automatic signals and to use extreme caution. All these circumstances may have led the motorman of train 142NL to believe that the track ahead was clear. After the train departed the Sutter Avenue Station and approached the tunnel entrance, the motorman must have assumed that the track was clear and failed to maintain a diligent lookout ahead.

Interdepartment communication is necessary for a system as large as the NYCTA to perform the many functions necessary to keep trains running. The command center must be made aware of any activity or event which affects the operation of trains, regardless of its duration. The failure to notify the command center of the intermittent deenergizing of the signal power, of the cutting of signal power switches in and out by the signal department, and that substations were off the line created a hazardous situation. The Safety Board believes that the NYCTA must require better interdepartment communications to give the command center the ability to properly and safely direct train movements.

Because of the failure of employees to transmit vital information to the command center, it was virtually impossible for command center personnel to have known the locations of the trains and the conditions that existed in the area before the accident occurred. Command center personnel do not have an electronic model board display to indicate the locations of trains. If train 142NL had been held at the red signal at the Saratoga Avenue Station until the signal maintainer had contacted the command center instead of being flagged through, the command center would have known the location of train 142NL and could have held the train until trains 122NL and 132NL ahead were moved forward. The investigation could not determine when or by whom the trip arm at the north end of the Saratoga Avenue Station was tied down. The practice of signal foremen and maintainers hooking trip arms down and flagging trains by red signals without notifying the command center creates a situation where a train can enter a portion of the system without the command center being aware that the train is in the area.

In this accident, when the signals failed and the motormen were instructed to "key by," the safe movement of the trains was no longer assured by the signaling equipment but was dependent upon the skill and alertness of the motormen. Accident investigations have demonstrated that people make mistakes in these circumstances. In four previous accidents investigations, ^{2/} the Safety Board found that the onboard crewmembers did not take adequate action to avoid a collision. Therefore, positive means to insure train separation, other than the motorman, must be used. The broad permission given by the command center trainmaster for motormen to key by all automatic signals was a violation.

^{2/} Railroad Accident Reports: "Collision of Illinois Central Gulf Railroad Commuter Trains, Chicago, Illinois, October 30, 1972" (NTSB-RAR-73-5); "Collision of Two Penn Central Commuter Trains at Botanical Gardens Station, New York City, January 2, 1975" (NTSB RAR-75-8); "Rear-End Collision of Two Greater Cleveland Regional Transit Authority Trains, Cleveland, Ohio, August 8, 1976" (NTSB-RAR-77-5); "Rear-End Collision of Two Chicago Transit Authority Trains, Chicago, Illinois, February 4, 1977" (NTSB-RAR-77-10).

of NYCTA rule No. 37 that requires motormen to obtain permission to pass a dark signal. By giving blanket permission to key through, the command center relinquished to the motormen its responsibility for directing the train movements through the dark signal area. If the command center had required the motormen to stop their trains at each dark signal as required by rule No. 37, the command center could have ascertained the location of each train and, by radio commands with direct instructions to each motorman, could have safely moved the trains through the dark area. If the command center had assumed its responsibility in this manner, this accident might not have occurred.

This accident indicates that training for operating department personnel on the operation of the signals and trip arms is inadequate. Motormen were operating trains on the run from New Lots Avenue to 241st Street under two different train control systems but did not know what the differences in the systems were. They did not understand the protection or lack of protection provided by the trip arms of each system. Their lack of understanding that in some sections of track the trip arms do not come up automatically if a signal power failure occurs, and the practice of hooking trip arms down when a power failure occurs led to confusion about the conditions that existed in the affected area. Moreover, the train dispatchers and trainmasters at the command center and their supervisors also did not know that the two different systems existed on this line. For the NYCTA to have allowed this situation to arise demonstrates a fundamental lack of concern for adequate operating procedures on the part of management. The Safety Board believes that it is essential for all operators of NYCTA trains and those charged with the responsibility for handling the trains to be trained thoroughly in the use of the two train control systems.

The first fire department units to arrive at the accident site did not know what the situation was that they were responding to. This lack of information resulted in delay because of their having to assess what had happened, locate the train cars in the tunnel, and call for additional help. The motorman of train 132NL had assessed the situation at the collision site and reported his findings to the command center. However, because the command center apparently did not give sufficient information to the fire department, they arrived with insufficient men and equipment. Rescue personnel had difficulty in evacuating the passengers from the elevated portion of the track because there is no emergency stairway to the street level at this location. The NYCTA should evaluate the difficulties experienced because of the location of this accident and take action to provide adequate means for the emergency evacuation of passengers and crew in future accidents.

As a result of this investigation, the National Transportation Safety Board recommends that the New York City Transit Authority:

Train operating department personnel in the differences between the two train control systems used on the New York City Transit Authority system. (Class II, Priority Action) (R-82-35)

Provide additional safeguards for "keying by" automatic signals in an emergency by requiring trains to stop at each signal and receive permission from the command center to proceed. (Class II, Priority Action) (R-82-36)

Require that any event or activity affecting the operation of trains be reported to the command center immediately. (Class II, Priority Action) (R-82-37)

Eliminate the practice of allowing nonoperating personnel to flag trains through red signals. (Class II, Priority Action) (R-82-38)

Accelerate the modernization of the New York City Transit Authority train control signal system by installing the prevalent TA train control, with particular emphasis on eliminating the use of two different types of signal systems on the same route. (Class II, Priority Action) (R-82-39)

Improve procedures and coordination between operating departments for handling train operations during emergencies or maintenance work. (Class II, Priority Action) (R-82-40)

Review and revise operating rules, procedures, and practices for other-than-normal train operations, and insure proper training through instructions, drills, and monitoring of employee compliance. (Class II, Priority Action) (R-82-41).

Review and revise the procedures for notification of emergency and rescue personnel to eliminate delays and provide as much available information as possible to assist them in assessing the equipment and manpower requirements. (Class II, Priority Action) (R-82-42)

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS and BURSLEY, Members, concurred in these recommendations.


By: Jim Burnett
Chairman