

RAILROAD ACCIDENT INVESTIGATION

REPORT NO. 4150

LONG ISLAND RAIL ROAD COMPANY

PENN CENTRAL COMPANY

ACCIDENTS

January 25, 1969
May 27, 1969
June 23, 1969 (2)
August 13, 1969

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

Washington, D. C. 20591

LONG ISLAND RR ACCIDENT - AUGUST 13, 1969Location of Accident

The accident occurred in tunnel 3 of the East River Tunnels, 1,770 feet west of the Long Island portal. East-bound movements in tunnel 3 are governed by automatic block signals and cab signals. Four eastward block signals, approximately 1,800 - 2,000 feet apart, were involved in the accident. From the west, these four signals are designated as 3E14, 3E18, 3E22 and 3E24.

The collision occurred in the block of signal 3E22, about 1,300 feet east of that signal and 500 feet west of signal 3E24.

Signal System

The circuits of the signal system are so arranged that when the block of signal 3E22 is occupied by a train, signal 3E14 displays an Approach aspect for a following train, and signal 3E18 and 3E22 display Stop-and-Proceed aspects. This, under the carrier's operating rules, requires the following train to reduce speed to not exceeding 30 m p h in the block of signal 3E14, and to stop at signals 3E18 and 3E22. After stopping at each of the latter two signals, the train may proceed in the block of each signal at not exceeding 15 m.p.h., prepared to stop short of a train ahead. When the train passes signal 3E18 under the above circumstances, its cab signal begins to display a Restricting aspect. At that time, the train must reduce speed to 15 m p h or less and not exceed 15 m p h while moving in the blocks of signals 3E18 and 3E22, otherwise its brakes will apply automatically.

Circumstances Prior to Accident

The East River Tunnels, including the track structures and signals therein, are owned and maintained by the Penn Central. About one month before the accident, the Penn Central began to experience intermittent trouble with the track circuit between signal 3E22 and 3E24 in Tunnel 3, due to rainy weather and high humidity conditions; water seeping through the tunnel lining, and water saturating the track structure between the aforesaid signals because of deteriorated drainage conditions. As a result of this damp situation, the ballast resistance between signal 3E22 and 3E24 intermittently became so poor that electrical energy drained from the track circuit to the extent that the rotor of the centrifugal-type relay in the housing of signal 3E22 would not spin fast enough to close the relay contacts. Consequently, signal 3E22 would continue to display a Stop-and-Proceed aspect after a train moved through its block and signal blocks beyond, causing delays to following trains.

About two weeks before the accident, the Penn Central stationed signal maintainers at signal 3E22 to alleviate the situation. After a train moved through the block of signal 3E22 and passed signal 3E24, the signal maintainer

on duty manually cleared signal 3E22 for the next train by closing its relay contacts with a wooden plug. The rotor of the relay would start to turn (slowly, because of reduced energy) after the train passed signal 3E24. Upon seeing the rotor start to turn, the signal maintainer would manually clear signal 3E22 for the next train.

A few days before the accident, Penn Central forces began to work in tunnel 3 to correct the damp condition which affected the operation of signal 3E22. This work was completed after the accident.

The Accident

No 96, an eastbound Long Island RR passenger train consisting of 10 electrically-propelled cars, left Pennsylvania Station at 8:40 a. m., with passengers occupying the first five cars only. Soon afterward, it entered tunnel 3 and passed signals 3E14, 3E18 and 3E22, which displayed Clear aspects. As the train moved in the block of signal 3E22, the aspect of its cab signal changed from Clear to Restricting, due to reduced energy in the cab-signal track circuit, and the engineer promptly reduced the speed to about 10 m p h. When the front of the train passed signal 3E24, which displayed a Clear aspect, the cab signal aspect returned to Clear, and the engineer began to increase the speed. A few moments later, at 8:46 a. m., No 96 was struck from the rear by train No. PJ 840. The collision occurred in the block of signal 3E22, about 500 feet west of signal 3E24. At that time, No 96 had partially passed signal 3E24 and its speed had not increased significantly.

No. PJ 840 consisted of 10 electrically-propelled passenger cars. This train, with no revenue passengers aboard, left Pennsylvania Station at 8:42 a. m. and followed No. 96 into tunnel 3 at an interval of about two minutes. Soon afterward, it approached signal 3E14, which displayed an Approach aspect due to No. 96 occupying the block of signal 3E22.

As No PJ 840 neared signal 3E14, the aspect of that signal changed to Clear as a result of the signal maintainer manually clearing signal 3E22. The train then began to increase speed. It was moving about 57 m p h. when it passed signal 3E18, which also displayed a Clear aspect due to the signal maintainer clearing signal 3E22. About that time, the engineer shut off power to reduce speed slightly and saw that signal 3E22 was displaying a Clear aspect. The speed was reduced to about 50 m p h when the train passed signal 3E22. Shortly afterward, as No PJ 840 moved on a curve in the block of signal 3E22, the cab-signal aspect apparently changed to Restricting and the engineer saw the lighted red marker lamps at the rear of No 96 come into view at a distance of about seven or eight cars lengths. He immediately applied the brakes of his train in emergency, then ran into the passenger compartment of the first car and called a warning to other members of the train crew. A few seconds later, when its speed had been reduced to an estimated 30 m.p.h., No PJ 840 struck the rear end of No 96.

Signal Maintainer

The signal maintainer on duty at signal 3E22 at the time of the accident was first employed by the Penn Central in January 1967. In October 1968, he qualified for, and was awarded, the position of signal maintainer, after attending the carrier's signal school for two months. His statements indicate he was thoroughly familiar with the nature of his duties on the day of the accident.

He reported for duty at signal 3E22 about 8:00 a.m. and had manually cleared that signal for seven or eight trains prior to the accident. He stated that some time after No. 96 passed signal 3E22, he saw the rotor of the signal relay start to turn slowly and this indicated to him that No. 96 had moved through the block of signal 3E22 and had passed signal 3E24. He said he then manually closed the relay contacts to clear signal 3E22 for the next train, which was No. PJ 840.

Casualties

The conductor, engineer and two trainmen of PJ 840, and the conductor, engineer, three trainmen and fifty-seven passengers on No. 96 were injured.

Damages

No. 96 moved 96 feet eastward after the collision. None of its cars derailed. The last car, however, was considerably damaged.

No. PJ 840 stopped with the front end 40 feet to the rear of No. 96. The rear trucks of the second and fourth cars, and the front truck of the fifth car, were derailed. The first six cars in the train were damaged considerably. The last four cars were slightly damaged.

According to the carrier's estimate, the costs of damages to the train equipment and track structure were \$98,300 and \$2,500, respectively.

Signal System Tests

In view of the signal maintainer's statements, tests were made to determine whether the rotor of the signal 3E22 relay would turn while the block of the signal was occupied. The relay rotor remained stationary during those tests.

The results of the tests are inconclusive, however, as there is a possibility the relay rotor reacted as described by the signal maintainer. Adverse electrical propulsion conditions infrequently cause rotors of signal relays to turn slowly even though the signal blocks remain occupied. Such conditions might have existed at the time No. 96 was moving in the block of signal 3E22, causing the signal relay rotor to turn slowly and leading the signal maintainer to clear the signal although No. 96 still occupied its block.

Conclusions

The procedure adopted to expedite movements through the block of signal 3E22 relied solely on movements of the signal relay rotor for determination as to when the block was unoccupied. It required interference with the functioning of signals 3E14, 3E18 and 3E22, inasmuch as the signal maintainer would manually clear signal 3E22 when its relay rotor started to turn and thereby cause signals 3E14 and 3E18 to clear automatically. Since a signal relay rotor might turn under certain conditions even though the block of the signal remains occupied, it is evident that the procedure adopted to expedite movements through the block of signal 3E22 was unsafe. It is further evident that the procedure was not in accordance with the FRA's signal rule 236 4, which prescribes that "The normal functioning of any device shall not be interfered with in testing or otherwise without first taking measures for insuring safety of train operation which depends on normal functioning of such device."

Cause

This accident was caused by the signal maintainer manually clearing a malfunctioning signal for the following train while the block of the signal remained occupied by the preceding train, resulting from the unsafe method adopted by the Penn Central to expedite train movements in the area of the malfunctioning signal.

Recommendations

1. With respect to the Long Island Rail Road and Penn Central incidences of January 25 and May 27, it is doubtful any casualties would have occurred had passengers in the cars experiencing fire and serious arcing promptly moved to other cars and refrained from using emergency-brake and/or communicating-whistle cords to give the engineers stop signals, which caused the trains to stop in the tunnels.

We recommend therefore that the Long Island Rail Road and the Penn Central ---

(a) Initiate educational programs to familiarize passengers with emergency procedures in the case of electrical fire or serious arcing on a train moving in a tunnel, and with the risks involved in stopping a train in a tunnel because of electrical fire or serious arcing.

(b) Remove emergency-brake and communicating-whistle cords from interiors of electrically-propelled passenger cars to prevent unnecessary and/or unauthorized use thereof by passengers.

In connection with the Long Island Rail Road incident of January 25, we also recommend that both this railroad and the Penn Central modify electrically-propelled passen-

ger cars to the extent necessary for making electrical equipment susceptible to failure readily observable and accessible for routine inspections

We further recommend that both of the aforesaid carriers take whatever action may be necessary to ensure that routine inspections of electrical equipment are of sufficient quality to disclose and correct defective conditions which are potentially dangerous and/or may lead to train delays

2 Violations of the carrier's operating rules and perhaps the relative inexperience of the flagman of train No 751 were significant causal factors in the Long Island Rail Road collision at Pennsylvania Station on June 23

We recommend that the Long Island Rail Road ---

(a) Take appropriate action to obtain compliance with its operating rules and regulations.

(b) Review the adequacy of its training program for newly-employed trainmen and take whatever action may be necessary to insure that such employees are fully qualified for train service

3 The cause of the Long Island Rail Road accident in the Elmhurst section of Long Island on June 23 was unique. Consequently, we have no recommendation for prevention of recurrence

4 Significant causal factors in the Long Island Rail Road collision of August 13 were the delay in taking action to remedy the damp tunnel conditions causing a signal to malfunction and the method employed by the Penn Central to expedite train movements through the block of the malfunctioning signal. This method was not only unsafe, but also in violation of the Federal Railroad Administration's signal rule 236 4

We recommend that the Penn Central ---

(a) Call the attention of all concerned to, and enforce compliance with, the aforesaid signal rule

(b) Promptly take the action necessary to remedy the cause of any signal malfunction

5 Investigation of the Long Island Rail Road and Penn Central incidences of January 25 and May 27 revealed serious deficiencies in tunnel facilities for the safe, timely and orderly evacuation of passengers on trains stopped in tunnels due to fire, and in the carriers' procedures for handling such emergencies. In both cases, the main thrust of the carriers' rescue efforts appears to have been directed at moving the disabled trains from the tunnel. While well intentioned, those efforts consumed considerable periods of time during which the comfort and safety of passengers in the smoke-filled tunnels were neglected. Consequently, pas-

sengers were left to fend for their own safety, except for what little and disorganized assistance was received from the train crews. In neither case were city fire fighting and rescue forces called to the tunnel by railroad personnel before a considerable lapse of time.

We recommend that the Long Island and/or Penn Central Railroads ---

- (a) Establish emergency procedures that give priority to the safety and comfort of passengers on trains stopped in tunnels due to fire
- (b) Initiate programs to inform passengers and railroad personnel of appropriate emergency procedures
- (c) Equip electrically-propelled passenger trains operating locally in the New York City area with public address systems, so that passengers may be promptly informed of emergencies and instructed accordingly.
- (d) Increase the illumination of tunnels by replacing the 25-watt light bulbs in service with bulbs having considerable higher wattage, and less widely spaced.
- (e) Install guard rails along the inside of tunnel walkways to assist, guide and protect passengers during emergency evacuations
- (f) Provide tunnels with directional signs, spaced a minimum of 300 feet apart and properly illuminated showing the direction and distance to the nearest alarm box, telephone and/or nearest portal or emergency exit
- (g) Increase the number of alarm boxes in tunnels and provide the boxes with proper illumination
- (h) Tie in each alarm box with the nearest city fire department
- (i) Issue and enforce regulations requiring train employees to utilize the nearest alarm box without delay when their trains stop in tunnels because of fire or similar mishap
- (j) Convert tunnel telephone systems in such manner that crews of trains stopped in tunnels because of fire or other emergency may communicate directly and instantly with the railroad official responsible for coordinating rescue efforts. Stencil emergency phone number of such official prominently at phone location.
- (k) Equip electrically-propelled passenger cars with electrically safe fire extinguishers maintained in good working order.

(1) Issue and enforce regulations requiring power directors to immediately actuate tunnel ventilating fans and shut off power to the third rail or catenary system, unless advised otherwise, when notified of a train stopped in a tunnel due to fire

Note: In connection with the aforesaid recommendations, existing railroad safety laws provide the FRA with no jurisdiction over the actual operation of trains; railroad operating rules; track structures; bridges; tunnels; track clearances; consist of train crews; qualifications of railroad employees; rail-highway grade crossing protection or running and draft gear on cars, or over the design, construction and maintenance of cars except for certain appurtenances covered by the Safety Appliance Acts and the Power Brake Law of 1958

Dated at Washington, D C , this 2nd
day of April 1970
By the Federal Railroad Administration

Mac E Rogers, Director
Bureau of Railroad Safety

LI RR accident 6/23/69
 Elmhurst, Long Island
 (not shown)

