INTERSTATE COMMERCE COMMISSION

Ex Parte No. 173

ACCIDENT NEAR COSHOCTON, OHIO

Submitted September 13, 1950. Decided October 4, 1950.

Accident near Cosnocton, Ohio, on September 11, 1950, caused by failure to operate the following train in accordance with signal indications.

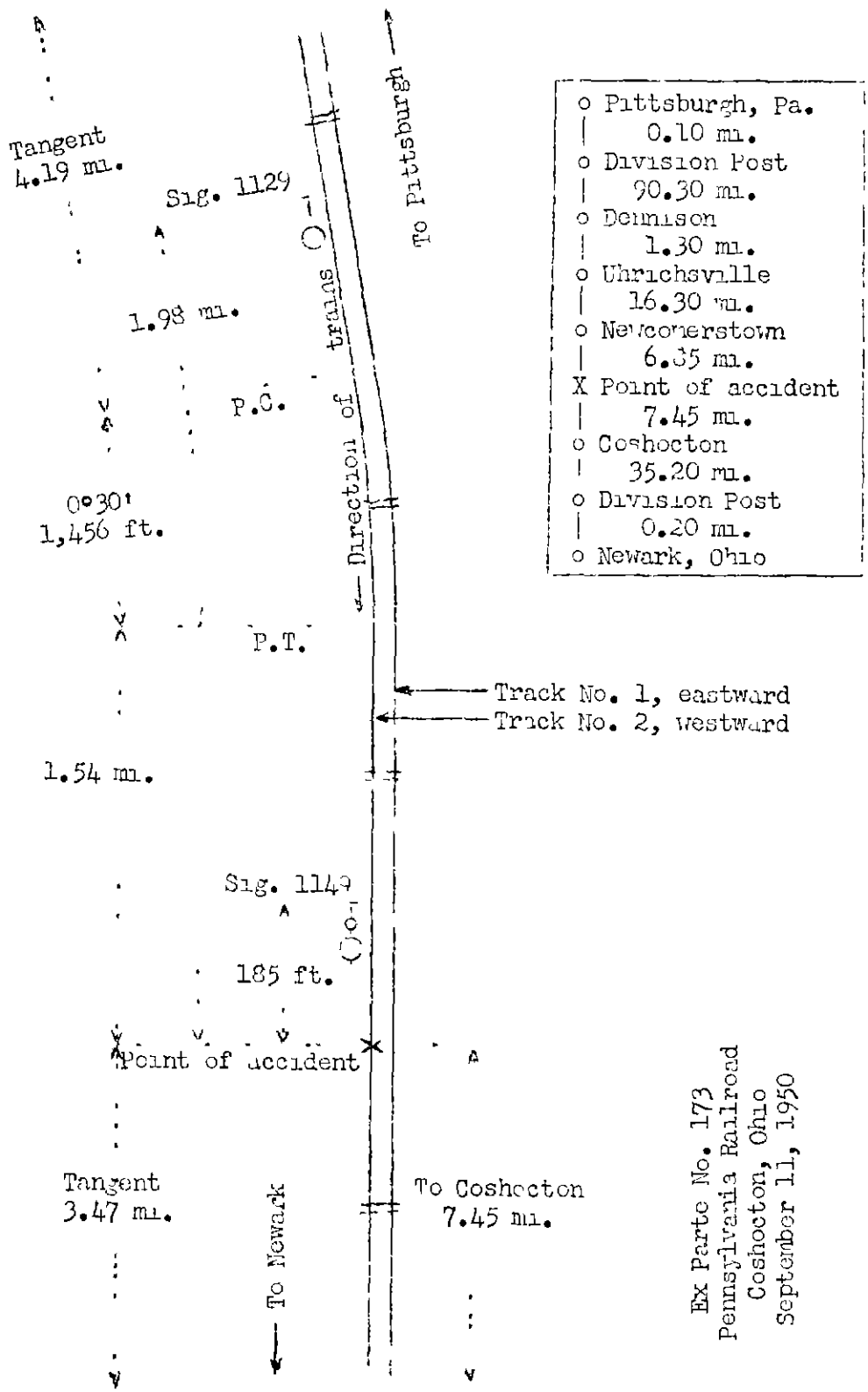
Lt. Col. George W. Haley for Department of Army Operation of Railroads.
O. B. Murray and C. F. Parshall for the Public Utilities Commission of Ohio.
A. Schroeder, A. M. Donnan, and S. W. Pringle for the Pennsylvania Railroad.
John W. Finnerty and William L. Knapp for Brotherhood of Locomotive Firemen and Enginemen.

REPORT OF THE COMMISSION

DIVISION 3, COMMISSIONERS PATTERSON, JOHNSON, AND KNUDSON

PATTERSON, Commissioner:

This is an investigation by the Commission on its own motion with respect to the facts, conditions and circumstances connected with an accident which occurred on the line of the Pennsylvania Railroad near Cosnocton, Ohio on September 11, 1950. Hearing was had at Pittsburgh, Pa., on September 13, 1950. The accident was a rear-end collision between two passenger trains and resulted in the death of 33 passengers and the injury of 258 passengers, 3 railway-mail clerks, 5 Pullman employees, and 12 train-service employees.



Ex Parte No. 173
Pennsylvania Railroad
Coshocton, Ohio
September 11, 1950

Location of Accident and Method of Operation

This accident occurred on the Panhandle Division which extends from Pittsburgh, Pa., to Newark, Ohio, 157.4 miles. In the vicinity of the point of accident this is a double-track line. The main tracks from south to north are designated as No. 1, eastward, and No. 2, westward. Trains moving with the current of traffic are operated by automatic block-signal and cab-signal indications. The accident occurred on track No. 2 at a point 114.95 miles west of Pittsburgh and 7.45 miles east of Coshocton, Ohio. From the east on track No. 2 there are, in succession, a tangent 4.19 miles in length, a 0°30' curve to the right 1,456 feet, and a tangent 1.54 miles to the point of accident and 3.47 miles westward. The grade for west-bound trains on track No. 2 is, successively, 0.33 percent descending 2,345 feet, 0.02 percent descending 1,735 feet, and 0.30 percent ascending 3,335 feet to the point of accident.

Automatic signals 1129 and 1149, governing west-bound movements on track No. 2, are located, respectively, 1.98 miles and 185 feet east of the point of accident. These signals are of the position-light type and are approach lighted. The approach lighting circuit of signal 1149 extends 3,612 feet in approach of the signal. Each signal displays three aspects. The aspects applicable to this investigation and the corresponding indications and names are as follows:

Signal	Aspect	Indication	Name
1129	Three amber lights in diagonal position to the right.	Proceed prepared to stop at next signal. Train exceeding Medium speed must at once reduce to that speed.	Approach.
1149	Three amber lights in horizontal position over one amber marker light.	Stop, then proceed at Restricted speed.	Stop-and-proceed.

The cab signals are of the continuous-inductive, four-indication, position-light type. The cab signals on each Diesel-electric locomotive are so arranged that their aspects may be observed by either engineman from his accustomed position in the control compartment. The aspects applicable to this investigation and the corresponding indications and names are as follows:

Aspect	Indication	Name
Three white lights in diagonal position to the right.	Proceed prepared to stop at next signal. Train exceeding Medium speed must at once reduce to that speed.	Approach.
Two white lights in diagonal position to the left.	Proceed at Restricted speed.	Restricting.

The controlling circuits of signals 1129 and 1149 are so arranged that when the block of signal 1149 is occupied, signal 1129 indicates "Approach" and signal 1149 indicated "Stop and Proceed." When a train enters a block at a roadway signal indicating "Approach," the indication of the cab signal corresponds to the indication of the roadway signal. When a train enters a block at a roadway signal indicating "Stop and Proceed," the cab signal indicates "Proceed at Restricted Speed." When a cab signal changes to a more restrictive aspect, a warning whistle in the cab sounds until an acknowledging foot pedal is manually operated.

This carrier's operating rules read in part as follows:

DEFINITIONS

Medium Speed--Not exceeding one-half the speed authorized for passenger trains but not exceeding 30 miles per hour.

Restricted Speed--Not exceeding 15 miles per hour prepared to stop short of train, obstruction or switch not properly lined and to look out for broken rail.

Reduced Speed--Prepared to stop short of train or obstruction.

11. A train finding a fusee burning red on or near its track must stop and extinguish the fusee and then proceed at Reduced speed.

35. The following signals will be used by flagmen:
* * *

Night signals--A red light, torpedoes and fusees.

99. When a train stops under circumstances in which it may be overtaken by another train, the flagman must go back immediately with flagman's signals a sufficient distance to insure full protection, placing two torpedoes, and when necessary, in addition, displaying lighted fusees.

* * *

When a train is moving under circumstances in which it may be overtaken by another train, the flagman must take such action as may be necessary to insure full protection. By night, or by day when the view is obscured, lighted fusees must be dropped off at proper intervals.

* * *

Note.--When trains are operating under Automatic Block System Rules, the requirements of Rule 99, in so far as protecting against following trains is concerned, will have been complied with when full protection is afforded against trains moving at Restricted speed.

509. A train or engine must stop clear of a block signal indicating Stop. * * * When a train or engine is stopped by a Stop-and-proceed signal, it may then proceed at restricted speed.

29. When a signal, except a fixed signal, is given to stop a train, it must be acknowledged * * *

The maximum authorized speed for passenger trains was 70 miles per hour.

Description of Accident

Passenger Extra 5444 West, a west-bound passenger train, consisted of engines 5444 and 5526, two express cars, five coaches, one kitchen car, five coaches, one kitchen car, and six coaches, in the order named. All cars were of all-steel construction. This train departed from Pittsburgh at 1:40 a. m., passed Newcomerstown, the last open office, 6.85 miles east of the point of accident, at 4:28 a. m., and was stopped by an emergency application of the brakes about 4:38 a. m. at a point 7.45 miles east of the station at Coshocton. The rear end of the train stopped 185 feet west of signal 1149. About 4 minutes later the rear end of the train was struck by No. 31.

No. 31, a west-bound first-class passenger train, consisted of Diesel-electric units 5774A and 5776A, coupled in multiple-unit control, one storage mail car, one mail car, one baggage car, four sleeping cars, two dining cars, two sleeping cars, five coaches, and one observation car, in the order named. The first, second, third, and tenth cars were of conventional all-steel construction, and the other cars were of lightweight steel construction. This train departed from Pittsburgh at 2:08 a. m., 29 minutes late, passed Newcomerstown at 4 35 a. m , 40 minutes late, passed signal 1129, which indicated "Approach," passed the flagman of Extra 5444 West, passed signal 1149, which indicated "Stop and Proceed," and while moving at a speed of 48 miles per hour it struck the rear end of Extra 5444 West.

The first car of Extra 5444 West mounted the end sill of the tender of the second engine, and the coupler of this car passed through the end sheet of the tender. The ends of the first and second cars were bent inward, and the inside lining of these cars was loosened. The vestibule end sheets and the doors on the west end of the third car were bent. The fourth to the tenth cars, inclusive, were not derailed and sustained only minor damage. The coupler carry iron was down on the east end of the eleventh car. The coupler carry iron on the west end of the twelfth car was broken, the coupler dropped to the roadbed, and the west truck of this car was derailed. The vestibule end sheets, doors, and steps on the west end of the car were damaged. The thirteenth to the seventeenth cars, inclusive, sustained only slight damage. The east truck of the eighteenth car was derailed, and the superstructure on the east end of this car was demolished throughout a distance of about one-fourth its length. The entire superstructure of the nineteenth car was demolished and torn from the car. The trucks were demolished. The twentieth car stopped on its right side, at right angles to the track, with its east end on top of the east end of the eighteenth car.

The first Diesel-electric unit of No. 31 stopped on its left side, at right angles to the track, with its rear end against the east end of the eighteenth car and the bottom of the twentieth car of Extra 5444 West. The front truck and all appurtenances between the front truck and the rear truck were torn from the underframe. Both trucks were badly damaged. A portion of the underframe was broken out ahead of the front center plate, and the rear coupler was broken. The superstructure was badly damaged ahead of the operating compartment, along the left side, and at the rear of the unit. The second Diesel-electric unit was derailed to the south and stopped

upright with its front end against the rear end of the first Diesel-electric unit. Both trucks were badly damaged. The underframe on the west end of the unit was broken, and the superstructure was damaged. The first, second, and third cars were derailed but were not seriously damaged. There was no damage to the other equipment of this train.

The conductor of Extra 5444 West, and the engineer, the fireman, the conductor, the brakeman, five dining-car employees, one coach attendant, and one passenger representative of No. 31 were injured.

There was a light fog at the time of the accident, which occurred about 4·42 a. m.

Discussion

On the line on which this accident occurred trains are operated with the current of traffic by automatic block-signal and cab-signal indications. When a train operating under automatic block system rules is stopped under circumstances in which it may be overtaken by another train, the flagman must go back a sufficient distance to provide protection against trains moving at restricted speed. When a roadway signal indicates "Approach," a train may pass that signal but the speed must be reduced to not exceeding 30 miles per hour and the train must be so controlled that it can be stopped at the next signal. The same restrictions are applicable while a train is moving in a block under an "Approach" cab-signal indication. When a roadway signal indicates "Stop and Proceed," a train, after stopping at the signal, may proceed into the block governed by that signal, but the speed must not exceed 15 miles per hour and, in addition, the train must be so controlled that it can be stopped short of a preceding train. The same restrictions are applicable while a train is moving in a block under a "Restricting" cab-signal indication.

Extra 5444 West departed from Pittsburgh at 1:40 a. m. In the vicinity of Dennison, 24.45 miles east of the point of accident, the flagman, who was riding in the rear car, became aware that something was dragging either from the front of that car or from the rear of the preceding car. He stopped the train by use of the conductor's valve. After the train stopped, an inspection disclosed that the steam connector on the west end of the rear car had become detached and had been striking the track structure. The conductor and the brakeman made temporary repairs by suspending the connector from hooks provided for that purpose. After the

temporary repairs were completed, the train proceeded to Dennison and was stopped to supply the engine tenders with water. The flagman proceeded eastward to provide flag protection. A few minutes later Extra 5444 West was overtaken by No. 31 and the flagman's stop signals were acknowledged by the engineer of No. 31. After both tenders were supplied with water, Extra 5444 West departed westward and passed Uhrichsville, 23.15 miles east of the point of accident, at 4:13 a. m. As the train approached the point where the accident occurred, the engineers and firemen were in their respective positions in the cabs of the engines, the flagman was in the rear car, and the other members of the train crew were in various locations throughout the cars of the train. The roadway signals and the cab signals indicated "Proceed." An emergency brake application occurred and the train was stopped with the rear end 185 feet west of signal 1149. Before the train stopped, the flagman dropped a lighted 5-minute red fusee between the rails of track No. 2. When the train stopped, the conductor and the brakeman proceeded to the rear of the train, where an inspection disclosed that the air hose between the rear two cars was broken. The steam connector had again come in contact with the track structure and had struck the air hose with sufficient force to cause the break. The flagman proceeded eastward to provide protection. His flagging equipment consisted of a white light, a red light, torpedoes, and fusees. When he reached a point about 400 feet from the rear of his train he observed the headlight of No. 31 approaching at a distance of about 3/4 mile. At that time signal 1149 was not lighted because No. 31 had not entered the approach-lighting circuit. The flagman gave stop signals with a red light and continued eastward. When No. 31 was about 2,000 feet east of the flagman, he lighted and gave stop signals with a red fusee. The signals were not acknowledged. The flagman threw the lighted fusee at the front of the Diesel-electric unit as No. 31 passed him. At that time he observed that signal 1149 was lighted and was indicating "Stop and Proceed." The 5-minute fusee which the flagman had thrown off before his train stopped was still lighted after the accident occurred.

No. 31 departed from Pittsburgh at 2:08 a. m., 29 minutes late. At Dennison, the train was stopped in compliance with a "Stop and Proceed" indication of the roadway signal governing movements into the block which was occupied by Extra 5444 West. The fireman communicated by trainphone with the operator at Uhrichsville, and was informed by the operator that the train preceding No. 31 was Extra 5444 West. After Extra 5444 West departed, No. 31 proceeded through the block at

restricted speed. The speed of No. 31 was reduced at Newcomerstown from 76 miles per hour to 54 miles per hour to comply with a speed restriction at that point. No. 31 passed Newcomerstown at 4:35 a m., 40 minutes late. The speed was gradually increased to about 67 miles per hour as the train approached signal 1129. All roadway signals throughout a distance of about 20 miles east of signal 1129 and the cab signal in the control compartment of the first Diesel-electric unit of No. 31 had indicated "Proceed." Signal 1129 indicated "Approach," and the indication was called by the fireman. When the train passed the signal, the cab-signal aspect changed from "Proceed" to "Approach" and the cab-signal warning whistle sounded. The warning whistle was silenced by the manual operation of the acknowledging foot pedal by the engineer. Both the engineer and the fireman said a service application of the brakes was made to comply with the approach indication of the signal. However, the speed on the descending grade gradually was increased to about 70 miles per hour when the train was about 1 mile east of the point where the accident occurred. Both the engineer and the fireman said that visibility was restricted by fog. The engineer said he initiated a service application of the brakes when he saw the stop signals being given by the flagman of the preceding train. Immediat ly afterward both the engineer and the fireman observed the rear end of the preceding train and the engineer, without releasing the service application, initiated an emergency application of the brakes. The speed was reduced to 48 miles per hour when the collision occurred.

After the accident occurred, the remains of a fusee were found 506 feet east of the point of accident and between the rails of track No. 2. A fusee cap was found 416 feet east of the point of accident and 12 feet 6 inches north of the north rail of track No. 2. A partially burned fusee, which had been struck a heavy blow, was found 366 feet east of the point of accident and 15 feet north of the north rail of track No. 2. Apparently this was the fusee used by the flagman to give stop signals and which was thrown against the front of the Diesel-electric unit of No. 31.

The speed indicating and recording device was removed from the first Diesel-electric unit of No. 31 and tested. The device originally was calibrated for speeds of 16, 32, 56, 64, and 112 miles per hour, and was tested at these speeds. The corresponding speeds indicated by the device were, respectively, 16, 32⅓, 56⅓, 64⅓, and 110⅓ miles per hour. The corresponding speeds recorded on the tape of the device were, respectively, 17, 33, 58, 64½, and 110 miles per hour. The device was geared for operation with 42-inch wheels. However, the wheels of the first Diesel-electric unit of No. 31 which were driving the

device had been turned to a diameter of 40 inches, and the gear ratio was not changed to compensate for the smaller diameters of the wheels. As a result, the recorded speed of No. 31 was about 5 percent higher than the actual speed. Although the tape of the recording device indicated a speed of 73 miles per hour after No. 31 passed signal 1129 and a speed of 50 miles per hour when the collision occurred, the actual speeds were, respectively, 70 and 48 miles per hour.

The automatic cab-signal equipment of No. 31 had been tested before the train departed from Harrisburg and had functioned properly en route. The brakes of the train had been tested at Pittsburgh and had functioned properly when used. The air brakes of the cars were tested after the accident occurred, and, with the exception of the brakes of the west truck of the first car which were damaged as a result of the accident, they functioned properly. The brake equipment of the Diesel-electric units also was damaged as a result of the collision and could not be tested.

The rear three cars of Extra 5444 West were conventional all-steel cars and were of the same design and construction. Each was 80 feet 3-3/4 inches in length and weighed 122,000 pounds. The center sills of the twentieth car were broken as a result of direct shock in the collision. The superstructure at each end of this car was crushed throughout a distance of about 10 feet. Apparently, the underframe of the first Diesel-electric unit of No. 31 was deflected upward and struck the nineteenth car above the floor level. Although the center sills of the nineteenth car were intact that portion of this car above the floor level was sheared away and destroyed. The greater portion of the casualties occurred in this car. The center sills of this car were constructed of 18-inch ship channels, weighing 45.8 pounds per foot, with top and bottom cover plates. This car received class repairs in August 1943, and at that time the vertical end members, or collision posts, were reinforced to the extent that the ultimate shear valve, based on the area of the web and reinforcing plates at a point even with the underframe member, was equal to the Association of American Railroads requirement of 300,000 pounds. Although this car was built in 1909, its design and construction was such that it met the present minimum strength requirements of the Association of American Railroads for new passenger cars, which requirements were adopted as standard in 1945.

Both the engineer and the fireman of No. 31 observed the "Approach" aspect of signal 1129, and the indication was called as required by the rules. The engineer acknowledged the "Approach" cab-signal indication after the front of the train passed the signal. A stopping distance of 10,250 feet is provided between signals 1129 and 1149, which is adequate for the maximum authorized speed. The flagman of Extra 5444 West gave stop signals from a point about 500 feet from the rear of his train, which is sufficient distance to provide protection against a train moving at restricted speed. The engineer of No. 31 had passed the required physical examination on September 26, 1949. He said he thought the speed of No. 31 was about 50 miles per hour immediately before he saw the stop signals given by the flagman. However, the rules require that after passing a signal indicating "Approach" the speed must be reduced to not exceeding 30 miles per hour and the train must be so controlled that it can be stopped short of the next signal. A train may, after stopping, pass a signal indicating "Stop and Proceed," but the speed must not exceed 15 miles per hour and the train must be so controlled that it can be stopped short of a preceding train.

Cause

It is found that this accident was caused by failure to operate the following train in accordance with signal indications.

By the Commission, Division 3.

(SEAL)

W. P. BARTEL,

Secretary.