

INTERSTATE COMMERCE COMMISSION  
WASHINGTON

---

REPORT OF THE DIRECTOR  
BUREAU OF SAFETY

---

ACCIDENT ON THE  
PENNSYLVANIA RAILROAD

---

PHILADELPHIA, PA.

---

JULY 30, 1937.

---

INVESTIGATION NO. 2189

SUMMARY

---

Inv-2189

---

Railroad: Pennsylvania  
Date: July 30, 1937.  
Location: Philadelphia, Pa.  
Kind of accident: Side collision  
Trains involved: Freight : passenger  
Train numbers: AP-19 : 9  
Engine numbers: 3499 : 4819  
Consist: 54 cars and : 13 cars  
caboose  
Speed: 15-25 m.p.h. : 15 m.p.h.  
Track: 5° left curve; 0.65 ascending grade.  
Weather: Clear  
Time: 9:37 p.m.  
Casualties: 5 injured  
Cause: Failure to operate Train AP-19 in  
accordance with interlocking signal  
indications.

Inv-2189

September 24, 1937.

To the Commission:

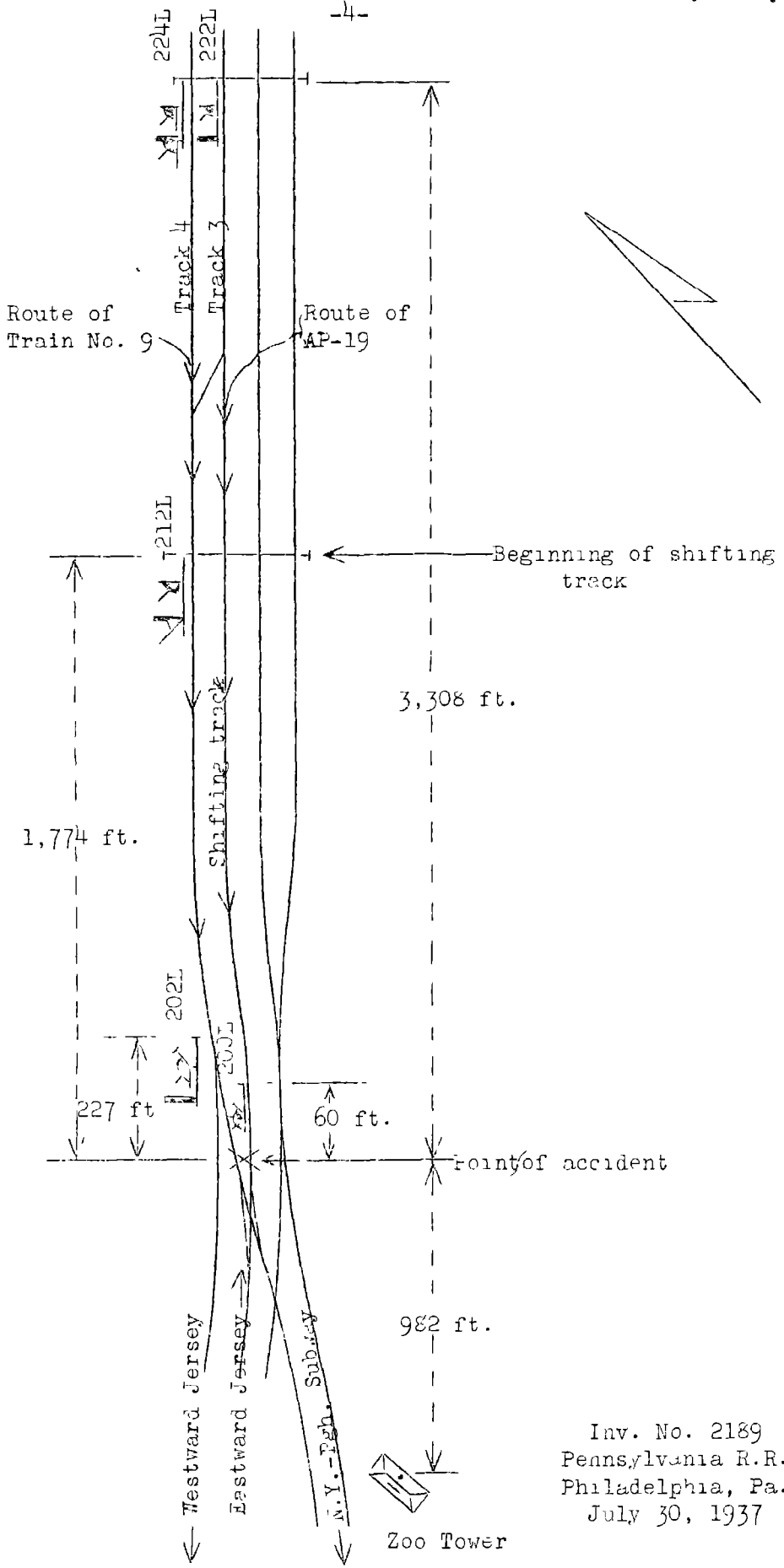
On July 30, 1937, there was a side collision between a passenger train and a freight train on the Pennsylvania Railroad at Philadelphia, Pa., which resulted in the injury of two passengers, one dining car employee and two railroad employees.

#### Location and method of operation

This accident occurred on that part of the Philadelphia Terminal Division extending between Frankford Junction and Broad Street, Philadelphia, a distance of 8.5 miles. The accident occurred within the limits of Zoo interlocking plant; approaching this plant from the east, this is a 4-track line over which trains are operated by timetable, train orders and an automatic block and cab-signal system. The tracks, numbered from south to north, are: 1, eastward passenger; 2, eastward freight; 3, westward freight, and 4, westward passenger. This identity, however, is changed within interlocking limits, and commencing at a point 1,545 feet west of the home signal and extending westward to dwarf signal 200L, a distance of 1,702 feet, track 3 is a shifting track used for movements in both directions. West of dwarf signal 200L the shifting track again becomes a main track extending in a northwesterly direction and is designated as the eastward Jersey track. An outbound city by-pass of the Pennsylvania Railroad, known as the New York-Pittsburgh subway, consists of a double-track line, which through various crossovers at Zoo interlocking plant, leads off the tracks previously mentioned to the southwest. The trains involved were a west-bound passenger train on track 4 and a west-bound freight train on the shifting track. The accident occurred 982 feet east of the interlocking tower, at the fouling point between the shifting track and the crossover leading from track 4 to the New York-Pittsburgh subway tracks. Approaching this point from the east the tracks are tangent for more than 1 mile, followed by a 30° curve to the left, 416 feet in length, the accident occurring at the western end of this curve. The grade for west-bound trains is slightly ascending, being 0.65 percent at the point of accident.

The Zoo interlocking machine consists of 170 working levers and is of the electro-pneumatic type, and all movements through this plant are controlled by signal indications. Running tracks are equipped with coded track circuits for the operation of cab

o	Frankford Jct., Pa.
	3.2 mi.
o	North Philadelphia
	2.9 mi.
X	Point of accident
o	Zoo interlocking
	2.4 mi.
o	Broad St. Station Philadelphia, Pa.



Inv. No. 2189  
 Pennsylvania R.R.  
 Philadelphia, Pa.  
 July 30, 1937

signals, but the shifting track is not so equipped for west-bound movements. The signals involved governing west-bound movements on track 4 are home signal 224L, and interlocking signals 212L and 202L, located 3,308 feet, 1,774 feet, and 227 feet, respectively, east of the point of accident. Signals 224L and 212L are located on signal bridges, while signal 202L is on a mast; these signals are 2-unit, position-light signals. For a movement through the plant from track 4 to the New York-Pittsburgh subway, home signal 224L displays a clear-restricting indication - "train proceed at not exceeding one-half its maximum authorized speed at point involved but not exceeding 30 miles per hour", - while signal 212L displays an approach-restricting indication - "train approach next signal at not exceeding one-half its maximum authorized speed at point involved but not exceeding 30 miles per hour", - and signal 202L displays a clear-restricting indication. The signals involved governing west-bound movements on track 3 and the shifting track, also of the position-light type, are home signal 222L, located on the same bridge as signal 224L, and dwarf signal 200L, located 60 feet east of the point of accident. With the route on track 4 lined, as described above, the most favorable indication signal 222L can display is a slow-speed indication - "train proceed at not exceeding 15 miles per hour prepared to stop at next signal"-, and dwarf signal 200L displays a stop indication.

The maximum authorized speed is 70 miles per hour for passenger trains and 45 miles per hour for freight trains east of Girard Avenue, which is about 600 feet east of the point of accident; the speed from that point westward is 30 miles per hour for all trains.

The weather was clear at the time of the accident, which occurred at 9:37 p.m.

#### Description

West-bound freight train AP-19, consisted of 54 cars and a caboost, hauled by engine 3499, and was in charge of Conductor Miller and Engineman Madenfort. This train operating on track 3, passed North Philadelphia, 2.9 miles from Zoo interlocking station, at 9:18 p.m., according to the train sheet, and stopped at home signal 222L where helper engine 2943, in charge of Engineman May, was attached to the rear of the train. After the indication of signal 222L changed from stop to a slow-speed, the train continued onto the shifting track, passed dwarf signal 200L, displaying a stop indication, and was struck by Train No. 9 at the fouling point of the cross-over, while traveling at a speed estimated to have been between 15 and 25 miles per hour.

West-bound passenger Train No. 9, consisted of four refrigerator milk cars, one combination baggage and passenger car, one coach, six Pullman sleeping cars, and one dining car, in the order named, all of steel construction, hauled by electric engine 4819, and was in charge of Conductor Henderson and Engineman Ayres. This train, operating on track 4, departed from North Philadelphia at 9:32 p.m., according to the train sheet, six minutes late, passed home signal 224L, displaying a clear-restricting indication, signal 212L, displaying an approach-restricting indication, and signal 202L, displaying a clear-restricting indication, and struck the engine of Train AP-19 while traveling at a speed estimated to have been about 15 miles per hour.

The left front corner of engine 4819 struck the right gangway of the freight engine, derailling engine 4819 which stopped between the Jersey tracks at a point 270 feet west of the point of accident. All of the cars in this train remained coupled but the first four were derailed and the fifth car stopped with its side against the sixth car in Train AP-19. The cab of engine 3499 was crushed, the steam pipes broken, and the distributing valve and right reservoir were torn off, destroying all the braking power on the engine and tender. The rear tender truck was derailed, and the engine and tender became separated from the train and followed the route set up for Train No. 9, stopping at a point 2,198 feet west of the point of accident. The derailed tender truck, however, became rerailed at a switch frog located 337 feet west of the point of accident. All of the trucks of the first three cars in this train became detached from the cars. The body of the first car stopped in upright position across the tracks to the left of and behind engine 4819. The second and third cars stopped on their left sides immediately behind the first car. The fourth and fifth cars were derailed but remained upright in general line with the track. Both engines and the four derailed cars in the passenger train were badly damaged. The employees injured were the engineman and fireman of Train AP-19.

#### Summary of evidence

Due to injuries sustained by Engineman Madenfort, of Train AP-19, his statement was not obtained until about four weeks after the accident, at which time he said that the cab-signal apparatus was tested and an air-brake test was made before leaving Camden, their initial terminal. Cars were picked up at Frankford Junction, after which a terminal air-brake test was made. The next stop was at the home signal at Zoo interlocking plant, where the brakeman went to the telephone and on his return informed the engineman that a helper engine was being attached and that their train was to run through the yard. After standing there a short time, the home signal changed from stop to slow-

speed; the flagman was recalled and the train proceeded at a low rate of speed. He observed signal 224L, governing movements on track 4, displaying a clear-restricting indication. On passing home signal 222L, the cab-signal indication changed to caution-slow-speed which he acknowledged, and that is the last thing that he remembered as he said he was struck on the head by some object when passing under the 33rd Street bridge just west of signal 222L. He did not remember hearing the brakeman or fireman call the stop indication of the dwarf signal, nor did he remember closing the throttle and applying the brakes in emergency. He stated that he is thoroughly familiar with the characteristics of Zoo interlocking plant. Engineman Madenfort further stated that the brakeman had been calling the signal indications en route as he was more familiar with the territory than the fireman who was a new man on this division.

Fireman Ryder, of Train AP-19, stated he was not familiar with physical characteristics in this territory as this was only his second trip on this division. When the stop was made at home signal 222L, he did not know that they had stopped at the entrance to the Zoo interlocking plant nor that a helper engine was being attached. He thought his train stood there about 10 minutes. About 2 or 3 minutes after receiving the slow-speed indication at the home signal, the train proceeded and after traveling a short distance the engineman shut off steam, and the train drifted at a speed of about 15 miles per hour. The brakeman was in the gangway looking out from first one side and then the other and was on the fireman's side when he called out "stop signal", and the engineman made what sounded like a service application of the air brakes, followed by an emergency application. Fireman Ryder said he then looked ahead and saw the dwarf signal in the stop position at which time his engine was about 10 car lengths from it, and that he had not maintained a constant lookout himself after leaving the home signal. He estimated the speed to have been about 15 miles per hour, the brakes did not seem to take hold and the speed had not been reduced at the time of the accident. The last time he saw the engineman was when the engine headed through the cross-over and the engineman was looking out of the window. Fireman Ryder stated that he did not recall estimating the speed of his train in a conversation with the road foreman of engines immediately after the accident, but in a later statement, when advised that other members of his crew had made estimates of 25 or 30 miles per hour, he stated that he may have been wrong in his estimate, and also that possibly the emergency application was the only application of the air brakes made just prior to the accident.

Head Brakeman Etzwiler, of Train AP-19, stated that after his train passed home signal 222L, the cab-signal warning whistle sounded and the engineman acknowledged it. After proceeding some distance through the plant, the train gathered speed and he remarked to the engineman: "we are not going through the yard this

way", meaning that the speed was too high to proceed into the yard, but the engineman made no attempt to reduce the speed. Brakeman Etwiler said that he was moving from one side of the gangway to the other and had been on the left side of the engine about a minute when he saw the stop indication of the dwarf signal about 15 car lengths ahead. His train was then traveling at a speed of about 30 or 32 miles per hour. He immediately called a warning to the engineman who applied the air brakes in emergency and he thought that the speed had been reduced to about 15 or 18 miles per hour when the accident occurred. Brakeman Etwiler stated that he was thoroughly familiar with this territory, although he did not know that Fireman Ryder was a new man on this division. The only time Engineman Madenfort called for a signal indication was in the vicinity of Overbrook. Engineman Madenfort appeared to be in normal condition.

Conductor Miller, of Train AP-19, stated that a brake test was made after the helper engine was attached to the caboose. The train then proceeded and had attained a speed of about 25 miles per hour when the air brakes were applied in emergency and the train stopped suddenly. Flagman Fargo estimated the speed of their train to be 30 miles per hour when the air brakes were applied in emergency. He saw the passenger train as it passed his own train, using only a few seconds to do so.

Engineman May, of the helper engine of Train AP-19, stated that he was working steam and the speed was about 25 miles per hour when the air brakes were applied in emergency, the train stopping in about 10 or 15 car lengths. He observed the rear end of Train No. 9 when his engine was a short distance beyond 33rd Street. Fireman Dyer, of the helper engine, also estimated the speed of their train to have been 25 miles per hour at the time of the emergency application.

Engineman Ayres, of Train No. 9, stated that the departure test of the cab-signal apparatus was made before leaving the initial terminal and the cab signals functioned properly en route. An air-brake test was also made and the brakes worked satisfactorily. After leaving North Philadelphia his train attained a speed of about 50 miles per hour, passed automatic signal 365, displaying an approach-restricting indication, and he reduced the speed to about 30 miles per hour and maintained that speed; passed home signal 224L, displaying a clear-restricting indication, and interlocking signal 212L, displaying an approach-restricting indication. The cab signals had been operating in conformity with the indications of the wayside signals and on approaching signal 202L, which was displaying a clear-restricting indication, Engineman Ayres made an 8 or 10 pound brake-pipe reduction, reducing the speed to about 15 miles per hour, and



placed the brake valve in the lap position. When his engine was about its own length beyond the signal, the cab signal indication changed from approach-restricting to caution-slow-speed and the warning whistle sounded. He immediately applied the air brakes in emergency and the engine started to tip.

Fireman Adams, of Train No. 9, stated that he was on his seatbox and saw the freight train on track 3 in the vicinity of the home signals at 33rd Street. His own train was gradually overtaking that train but at no time did his train pass the freight engine, in fact, he did not see that engine until just before the collision. He was watching the signals and just as the cab signal changed to caution-slow-speed, after passing signal 202L, the engineman applied the air brakes in emergency; he had a glimpse of the freight engine and saw that his own engine was going to strike it and he jumped away from his seatbox.

The statements of Conductor Henderson, Baggage man Savage and Flagman Musselman brought out nothing additional of importance.

Train Director Creely, at Zoo interlocking station, stated that he received an advance report from the operator at North Philadelphia interlocking station that Train AP-19 had left North Philadelphia before Train No. 9. About 9:30 p.m. the route was lined for Train No. 9 to proceed from track 4 to the New York-Pittsburgh subway; a check of the model board showed the route to be properly lined and after Train No. 9 had entered the circuit approaching the first indication displayed for this route, the route was set up for Train AP-19 to proceed on track 3 and the shifting track, this route being lined about 9:33 p.m. with dwarf signal 200L displaying a stop indication and at no time did it display any other indication for Train AP-19. The first knowledge he had of anything wrong was when the engine passed the tower on the New York-Pittsburgh subway track, at which time the model board indicated something wrong at cross-over switches 193-195. He immediately instructed the leverman not to touch the machine so that the maintainer could check it to see if it were functioning properly.

Leverman Fuls, at Zoo interlocking station, stated that he set up the routes for Train Nos. 9 and AP-19, as stated by Train Director Creely, and that Train No. 9 was between Lehigh Avenue and 33rd Street when the slow-speed indication was displayed by signal 222L at 33rd Street for Train AP-19. Lehigh Avenue is located 1.75 miles east of 33rd Street. After the accident, locking devices were immediately placed on the levers controlling these routes.

Signal Maintainer McNamee, who was in the tower at the time of the accident, stated that the plant was working properly at the time of the accident.

Car Inspectors McManus and Regan, located at Frankford Junction, stated they assisted in making the air-brake test on Train AP-19 and found that the brakes were functioning properly.

Observations of the view of signal 200L, made by the Commission's inspectors, disclosed that the signal could be seen from both sides of the cab of an engine, moving westward on the shifting track, at a point 1,250 feet east of the signal and remained constantly in view from the left side of the cab; however, the signal disappeared from the engineman's view at a point about 1,000 feet east of the signal and did not reappear until within about an engine length from the signal. Observations of the possible indications of signal 222L disclosed that, with the crossover between that signal and signal 212L lined for a movement from track 3 to track 4, the most favorable indication signal 222L can display is clear-restricting. With the route lined for a through movement on the shifting track, signal 222L displays a slow-speed indication irrespective of the indication of dwarf signal 200L or of track conditions beyond, this indication authorizing a train to proceed at not exceeding 15 miles per hour prepared to stop at next signal.

Observations of signal apparatus immediately after the accident indicated that the route from track 4 to the New York-Pittsburgh subway was set for Train No. 9; that dwarf signal 200L was not damaged and all stop-position lenses of this signal were illuminated; and that signal 202L displayed a stop indication. A subsequent check made by test forces indicated that, with the route set as for Train AP-19 with signal 200L indicating stop and track approaching this signal unoccupied, signal 222L indicated slow-speed and distant automatic signal 865 on track 3 displayed an approach indication. After this observation was made and without changing the route, a check was made of the coded track circuits between signals 222L and 200L and it was found that no code could be obtained under these conditions, which was in agreement with the slow-speed indication displayed by signal 222L. Observations and tests indicated that all apparatus and functions controlling the signals involved were operating properly at the time of the accident.

#### Discussion

The evidence indicates that while Train AP-19 was standing on track 3 at home signal 222L, the route was set for Train No. 9, approaching on track 4, to continue through the plant to the New York-Pittsburgh subway. Signal 222L was then changed from stop to slow-speed, which authorized Train AP-19 to proceed at a speed not exceeding 15 miles per hour prepared to stop at dwarf signal 200L which displayed stop. Train AP-19 proceeded shortly thereafter and a speed of 25 or 30 miles per hour was attained;

the head brakeman cautioned the engineman regarding the speed, but no reduction was made until the brakeman called the stop signal when 15 car lengths from it, at which time an emergency application of the air brakes was made. Due to the track curvature the engineman could not see signal 200L after reaching a point approximately 1,000 feet from it until his engine was about an engine length away. A clear view, however, could be had from the fireman's side and the head brakeman stated that he had been looking out from both sides of the gangway and had been standing on the left side about one minute when he saw the stop indication, then about 15 car lengths from it. The fireman was a new man on this division and was not acquainted with the physical characteristics of this plant, although he saw the stop indication after the brakeman had called its indication. The engineman stated that he did not remember anything after passing home signal 222L, as some object hid him on the head when passing under a highway bridge just west of that signal; however, the statements of the fireman and head brakeman, who were on the engine with him, indicated that he appeared to be in normal condition, looking out of his cab window and that he made an emergency application of the air brakes when warned of the stop indication displayed by signal 200L.

The engine of Train No. 9 passed Train AP-19 and overtook its engine at the cross-over. Signal 202L is located 167 feet to the rear of dwarf signal 200L; therefore, the track circuits in connection with the route set were not shunted by Train AP-19 until after Train No. 9 had passed signal 202L, but the shunting did result in a change in the cab indication on the engine of Train No. 9 when it was a very short distance past the signal, but the distance to the fouling point was then insufficient to stop before the accident occurred.

#### Conclusion

This accident was caused by the failure to operate Train AP-19 in accordance with interlocking signal indications.

Respectfully submitted,

W. J. PATTERSON,

Director.