

INTERSTATE COMMERCE COMMISSION
WASHINGTON

REPORT OF THE DIRECTOR
BUREAU OF SAFETY

ACCIDENT ON THE
DELAWARE, LACKAWANNA & WESTERN RAILROAD

PORT MORRIS JUNCTION, N. J.

JUNE 3, 1939

INVESTIGATION NO. 2360

SUMMARY

Inv-2360

Railroad: Delaware, Lackawanna & Western
Date: June 3, 1939
Location: Port Morris Junction, N. J.
Kind of accident: Rear-end collision
Trains involved: Freight : Passenger
Train numbers: Extra 2125 : Second 9
Engine numbers: Helper 1109 and 2125 : 1404
Consist: 96 cars and caboose : 8 cars
Speed: 4-12 m. p. h. : Not determined
Operation: Timetable, train orders, automatic
block-signal system, and interlocking
Track: 4-track line; 3°40' portion of compound
curve to left; 0.387 percent ascending
grade
Weather: Clear
Time: 11:40 p. m.
Casualties: 11 injured
Cause: Failure of Second 9 to observe and obey
signal indications

Inv-2360

July 14, 1939.

To the Commission:

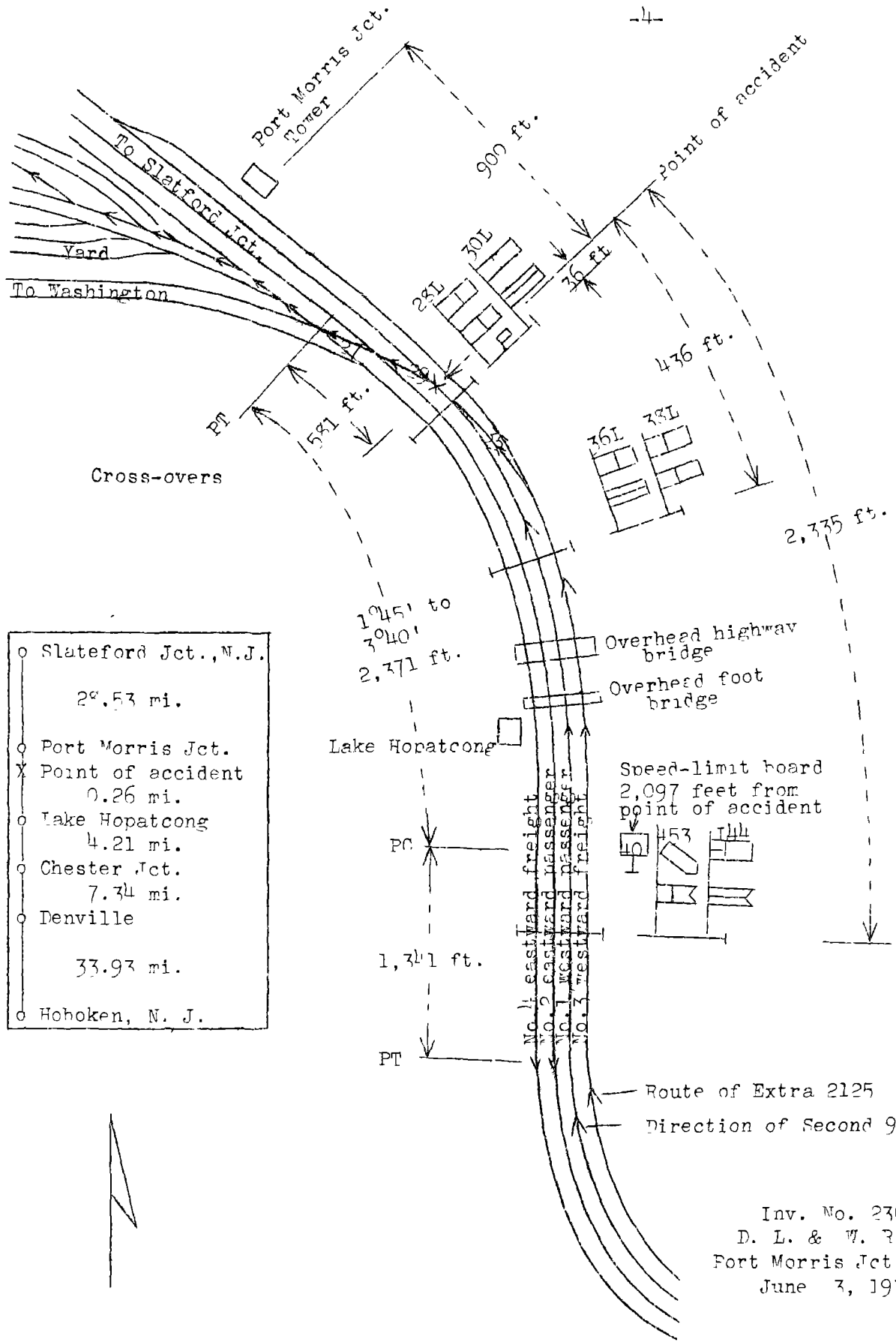
On June 3, 1939, there was a rear-end collision between a freight train and a passenger train on the Delaware, Lackawanna & Western Railroad at Port Morris Junction, N. J., which resulted in the injury of nine passengers and two employees. The investigation of this accident was made in conjunction with representatives of the New Jersey Board of Public Utility Commissioners.

Location and Method of Operation

This accident occurred on that part of the Morris and Essex Division which extends between Hoboken and Slateford Junction, N. J., a distance of 74.27 miles. In the vicinity of the point of accident this is a 4-track line over which trains are operated by timetable, train orders, and an automatic block-signal system. The tracks, numbered from south to north, are 4, eastward freight; 2, eastward passenger; 1, westward passenger; and 3, westward freight. At Port Morris Junction two main tracks continue in a westerly direction to Blairstown and two main tracks diverge in a southerly direction to Washington; Port Morris yard is situated in the angle formed by these lines. Movements at the junction, including those to and from the yard tracks, are governed by an interlocking. The accident occurred within interlocking limits on track 1 at a point 900 feet east of the interlocking tower.

Approaching the point of accident from the east there is a compound curve to the right 7,095 feet in length, varying in curvature from $0^{\circ}45'$ to $3^{\circ}05'$, followed by a tangent 1,341 feet in length, and then a compound curve to the left 2,371 feet in length, varying in curvature from $1^{\circ}45'$ to $3^{\circ}40'$; the accident occurred on the $3^{\circ}40'$ portion of the latter curve at a point 581 feet from its western end. The grade for west-bound trains varies from 1.01 percent to 1.3 percent ascending a distance of more than 1 mile; it then varies from 0.536 to 0.387 percent ascending a distance of approximately 1,050 feet to the point of accident and some distance beyond.

The interlocking machine is of the electro-pneumatic type and has 36 working levers. Approach, section and route locking are provided. Back-locking is provided to insure that the various signals involved are in their most restrictive positions.



o	Slatford Jct., N.J.
	2 ⁰⁰ .53 mi.
o	Port Morris Jct.
x	Point of accident
	0.26 mi.
o	Lake Hopatcong
	4.21 mi.
o	Chester Jct.
	7.34 mi.
o	Denville
	33.93 mi.
o	Hoboken, N. J.



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 Port Morris Jct., N.J.
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The signals involved are located on bridges spanning the main tracks. The signals governing westward movements on track 1 are automatic signal 453 and interlocking home signals 36L and 28L, located 2,335 feet, 436 feet, and 36 feet, respectively, east of the point of accident; these signals are 2-arm, 2-position, lower-quadrant, semaphore signals. Signal 453 provides an approach indication for the home signals and normally displays an approach indication. The home signals normally display stop indications. The signal aspects and indications are as follows:

Signal 453: Green-over-green - Proceed. Name - Clear.
Green-over-yellow - Prepare to stop at next signal. Train exceeding medium speed must at once reduce to that speed. Name - Approach.
Red-over-yellow - Stop; then proceed in accordance with rule 509. Name - Stop and Proceed.

Rule 509d provides that on two or more tracks when a train is stopped by a stop-and-proceed signal it may proceed at once at restricted speed.

Home signal 36L: Green-over-red - Proceed. Name - Clear.
Red-over-red - Stop. Name - Stop.

The lower arm of this signal is fixed in horizontal position.

Home signal 28L: Green-over-red - Proceed. Name - Clear.
Red-over-green - Proceed at not exceeding medium speed. Name - Clear - Medium.
Red-over-red - Stop. Name - Stop.

Medium speed is defined: One-half maximum authorized speed at point involved, but not to exceed thirty miles per hour unless otherwise provided.

Restricted speed is defined: Prepared to stop short of train, obstruction, or anything that may require train to stop.

Rule D-152 reads as follows:

When a train crosses over to, or obstructs another track, unless otherwise provided, it must first be protected as prescribed by Rule 99 against trains moving with the current of traffic on that track.

Rule 605 reads as follows:

Interlocking signals operated by signalmen govern the use of the routes of an interlocking plant, and as to movements within Home Signal limits, their indications supersede the superiority of trains, but do not dispense with the use or the observance of other signals whenever and wherever they may be required. Rule D-152 need not be observed within Home Signal limits of interlocking.

Cross-over 35, 307 feet in length, leads from track 3 to track 1, and is located between the home signals. At a point 194 feet west of signal 28L cross-over 29 leads to track 2, and immediately beyond, cross-over 27 leads to track 4, followed by two facing-point switches leading to the lead tracks of the yard.

Signal 453 can first be seen by the engineman of a west-bound train a distance of 1,539 feet. The tracks in the vicinity of the home signals are located in a cut with high wooded banks, and a narrow foot bridge and an arched highway bridge span the main tracks at points 789 feet and 552 feet, respectively, east of signal 36L, thereby restricting the view of the signals. The fireman can first see signal 36L when under the foot bridge, a distance of 789 feet, and he can first see signal 28L, after passing under the highway bridge, a distance of 921 feet. The maximum authorized speed for first-class trains is 70 miles per hour. A speed-limit sign restricting speed to 40 miles per hour on track 1 is located 2,097 feet east of the point of accident, or 238 feet west of signal 453.

The weather was clear and the visibility was good at the time of the accident, which occurred at 11:40 p. m.

Description

Extra 2125, a west-bound freight train, consisted of 96 cars and a caboosse, hauled by engines 1109 and 2125, and was in charge of Conductor Sherbaugh and Enginemen Hartman and Arnt. This train left Dover, 7.62 miles east of Port Morris Junction, at

11:05 p. m., according to the train sheet, and passed Chester Junction at 11:16 p. m., operating on track 3. When this train arrived at Port Morris Junction the route was lined for its movement through the cross-overs to track 4 and thence to the yard. The train was proceeding to the yard at a speed of 4 to 12 miles per hour and the rear end was on track 1 just west of signal 28L when it was struck by Second 9.

Second 9, a west-bound passenger train, consisted of one baggage car and 7 coaches, all of all-steel construction, hauled by engine 1404, and was in charge of Conductor Dettenmayer and Engineman McCabe. This train departed from Dover at 11:30 p. m., according to the train sheet, 1 hour 21 minutes late, passed Chester Junction on track 1 at 11:33 p. m., 1 hour 18 minutes late, passed signal 453 at a speed of 50 to 55 miles per hour, passed signal 36L displaying a red-over-red aspect, ran through the trailing-point switch at the west end of cross-over 35, passed signal 28L displaying a red-over-red aspect, and collided with the rear of Extra 2125.

The caboose and two rear cars of Extra 2125 were thrown to the left, fouling tracks 2 and 4, and were demolished. The next two cars stopped on their sides to the left of track 1. The fifth car from the rear was derailed and off center; it stopped in line with track 2 and leaned at an angle of 45 degrees. The engine of Second 9 stopped upright and across the cross-over between tracks 2 and 1, parallel with the third car from the rear of Extra 2125, and 408 feet west of the point of collision. The first two cars in Second 9 were derailed and badly damaged and stopped in general line with the track. The third to sixth cars inclusive were slightly damaged, but were not derailed. The employees injured were the conductor and the flagman of Extra 2125.

Summary of Evidence

Engineman Hartman, of the lead engine of Extra 2125, stated that an air-brake test was made at Secaucus, their initial terminal, and the brakes functioned properly en route. He operated the train at a speed of 15 or 18 miles per hour between Chester Junction and Port Morris Junction. He received a green-over-yellow aspect at distant signal L44, located on the same signal bridge as signal 453, which also displayed a green-over-yellow aspect. Rounding the curve he received a red-over-red aspect on signal 38L; he closed the throttle and applied the independent air brake, but when within two car lengths of the signal the lower arm cleared, and he started using steam again. He continued through the interlocking to the yard and the train was traveling at a speed of 8 or 10 miles per hour when the rear end of his train was struck by Second 9.

Fireman Deremer, of the lead engine of Extra 2125, stated that he observed the green-over-yellow aspect displayed by signal L44 and the red-over-red aspect displayed by the second home signal which changed before they reached it.

The statements of Head Brakeman Armitage, who was on the lead engine, and Engineman Arnt, Fireman Palson, and Brakeman Decker, of the second engine of Extra 2125, brought out nothing additional of importance except that Fireman Palson and Brakeman Decker stated that when they observed the distant signal governing the movement of their train they also observed the signal governing track 1 and both signals displayed green-over-yellow aspects.

Conductor Sherbaugh, of Extra 2125, stated that the left marker light was turned to display red when they were in the vicinity of the yard-limit board. He was in the cupola on the left side and observed the green-over-yellow aspect displayed by the signal governing track 1. He did not hear Second 9 approaching until the flagman called a warning an instant before the accident occurred.

Flagman Kearney, of Extra 2125, stated that when starting through the cross-overs he turned the left marker light to display red and placed another red lantern on the rear of the caboose. He was on the right side in the cupola when he heard Second 9 which was then immediately behind them.

Engineman McCabe, of Second 9, stated that an air-brake test was made at Hoboken and the air brakes functioned properly en route. Approaching Lake Hopatcong, located about 1,225 feet east of the point of accident, he received a green-over-green aspect at signal 453, at which time he was operating his train at a speed of 50 to 55 miles per hour, and he called its indication to the road foreman of engines who was on the left side of the cab. The road foreman of engines answered him; the fireman at that time was on the deck. After passing that signal he eased off on the throttle and the speed was about 45 miles per hour when passing the station at Lake Hopatcong which was in compliance with the speed-restriction board located in that vicinity. The road foreman of engines then called the red aspect of signal 36L, at which time his engine was west of the overhead highway bridge; he immediately applied the air brakes in emergency and by that time the engine was passing the signal. He said that he did not see the signal until he had practically reached it. Engineman McCabe stated that after leaving Chester Junction the road foreman of engines came over to his side of the cab and they discussed the question of where they would stop for water. All signal indications were called en route, and he expected to pass through Port Morris Junction

interlocking without stopping. He is thoroughly familiar with this division. Signal 443, located 4,500 feet east of signal 453, displayed a green-over-green aspect, and although the physical characteristics approaching these two signals are similar, he did not think it possible that he could have mistaken one signal for the other.

Fireman Sturm, of Second 9, stated that after leaving Dover he experienced trouble with the stoker and several times it was necessary to shovel coal into the firebox, and he was so occupied when approaching Port Morris Junction. After passing Chester Junction he heard the road foreman of engines and the engineman engaged in conversation relative to where they would stop for water, the road foreman of engines having left his seat and crossed over to the right side of the cab, after which he resumed his place on the left side. He relied on the road foreman of engines to observe and call the signal indications during his absence from his seatbox. He did not hear the signal indications called just prior to the accident. Fireman Sturm stated that unless he has seen the signals he does not call the indications but advises the engineman that he has not seen them. Although signal 453 can first be seen by the engineman, this signal can be seen from the fireman's side of the cab after the engine has rounded the curve.

Road Foreman of Engines Scott stated that after leaving Chester Junction he left the seatbox on the left side of the cab and talked with the engineman relative to the point at which they would take water. He then resumed his place on the left side of the cab. Approaching Hopatcong station the speed of the train was about 50 miles per hour, and when rounding the curve east of that point the engineman called "clear block" at signal 453. Road Foreman of Engines Scott answered him and raised his hand, but he did not see the signal himself. The fireman was on the deck at that time. He then left his seatbox and went over to the right side of the cab to get a drink of water. He knew that a speed-restriction board restricting the speed to 40 miles per hour was located east of Hopatcong station; the engineman did not reduce the speed but continued to use steam, and the speed was about 50 miles per hour when the road foreman of engines saw the red aspects displayed by signal 36L, at which time they were close to the signal. The signal can first be seen after passing under the highway bridge located 552 feet east of the signal, but he was unable to see it immediately on account of smoke. Road Foreman of Engines Scott stated that he was not riding the train the night of the accident for the purpose of instructing or checking on the men, but for the purpose of taking care of anything that might come up.

The engine crew were very efficient men and it was not necessary for him to watch or check them. He had confidence in the engineman and considering his reliability as an engineman he assumed that the signal was clear and he paid no attention to it. He stated that the man that first sees the signal, no matter on which side of the cab he is located, calls its indication, and the other man accepts and repeats it. In answering a signal indication it is always repeated, and to his knowledge it has never been the practice to say, "I did not see it"; he added that this would have been a very unusual procedure. In the case of inexperienced or young enginemen, however, he would watch all signals.

Conductor Dettenmayer, of Second 9, stated that the train was traveling at a speed of more than 50 miles per hour and the engine was working steam, when he felt an emergency application of the air brakes which was followed by the collision.

Flagman Brobson, of Second 9, stated that the rear end of his train stopped between the two home signals; going back to flag immediately after his train stopped, he observed that signal 453 displayed a green-over-yellow aspect.

Towerman Henry, at Port Morris Junction, stated that when the annunciator in his tower indicated that Extra 2125 entered the track circuit, which extends approximately 7,075 feet east of the tower, he called the dispatcher who gave instructions for Extra 2125 to enter the yard ahead of Second 9; the latter train was then passing Denville, 11.71 miles east of Port Morris Junction, which was at 11:24 p. m. At 11:25 p. m. he lined the route for Extra 2125 to enter the yard, and at that time Extra 2125 was nearing Hopatcong station. Extra 2125 continued through the plant to the yard, but the speed was reduced to 4 or 5 miles per hour when the rear of the train had almost cleared the interlocking. He saw Second 9 approaching; he could hear the exhaust of the engine; realizing that it was not going to stop, he so advised the dispatcher. Towerman Henry stated that when entering the yard a train of about the length of Extra 2125 usually clears the interlocking in about 10 minutes. He is required to clear a freight train 5 minutes before the arrival of a passenger train and he thought there was sufficient time to clear Extra 2125 before the arrival of Second 9. He cleared the signals governing the route of Extra 2125 at 11:25 p. m., and the accident occurred at 11:40 p. m. Towerman Henry further stated that at the time the cross-over movement was being made by Extra 2125 the levers controlling the signals on track 1 were in normal position, and he could see by the street light that signal 36L was in the stop position.

Dispatcher Sisco stated that when the towerman at Port Morris Junction called him relative to Extra 2125 he considered that there was ample time for Extra 2125 to cross over and enter the yard without causing delay to Second 9, and he estimated that Extra 2125 would be in the clear in the yard 5 minutes before the arrival of Second 9.

Signal Maintainer Shubert stated that he was working in the west end of Port Morris yard when he was notified at 12:15 a. m., June 4, to go to the interlocking immediately as there had been an accident. He first went to the tower and found the route properly lined for the cross-over movement from track 3 to the yard; all switch levers were in the reverse position, corresponding with the position of the switches on the ground, and all interlocking home signals involved were in stop position; he instructed the towerman not to make any change in the switch or signal levers. On arrival of Leading Maintainer Rice he was instructed to go back to signal 453 to ascertain its aspect; it displayed a green-over-yellow aspect. Maintainer Shubert stated that it was cloudy but the visibility was good.

Leading Signal Maintainer Rice arrived at the scene of accident about 1:25 a. m., June 4. Inspection of the switches disclosed that the route had been properly lined for a cross-over movement from track 3 to the yard and that the west end of cross-over 35 had been run through by Second 9. All home signals governing tracks 1 and 3 displayed stop indications. He later made a preliminary inspection and test of signal 453 and did not find any mechanical defects. He stated that on March 22 a test had been made of the back-locking on signal 453 and it functioned as intended.

After the accident Mechanical Inspector Galla made a complete test of all mechanical locking involved and found it to be working satisfactorily. The route from track 3 to the yard was properly lined and all conflicting signals were locked in normal position.

Signal Engineer Saunders arrived at the scene of accident about 2:30 a. m. and when checking the position of the levers in the tower the towerman informed him that all switch levers involved were in the same position as at the time of the accident, but the signal levers had been restored to normal or stop position. He then inspected the track and found the west end of cross-over 35 considerably damaged on account of Second 9 having run through it in reverse position. All the signals involved were in normal position and displayed red aspects and could be seen plainly from a position on track 1 under the overhead highway bridge west of Lake Hopatcong station. Signal 453, which

displayed a green-over-yellow aspect, could be seen from a point 1,539 feet east of the signal. Signal L44, governing track 3, displayed a red-over-yellow aspect. He stated that it would be impossible for Second 9 to receive a green-over-green aspect at signal 453 with the route lined for Extra 2125 to enter the yard. This was checked on June 4. He said that it was also impossible for a route having first been set for a westward through movement on track 1 to be changed to permit a westward movement on track 3 crossing track 1 without first having set signal 36L to normal or stop position, in which case signal 453 would display an approach indication. This condition was proved by tests. Calculations, using the railroad's standard chart for braking distance, show that a passenger train traveling at a speed of 40 miles per hour can be stopped with a full-service brake application applied at the point of first visibility of the home signals from the fireman's side of the engine cab 789 feet from signal 36L. The distance from this point of observation to signal 28L is 1,139 feet, and if signal 36L had been observed at point indicated and the brakes had been applied, the accident would not have occurred. Tests were made after the track and switches had been repaired and all interlocking signals and switches functioned as intended. Further tests made on June 9 disclosed that the interlocking apparatus worked properly.

Signal Supervisor Johnson and Assistant Signal Engineer Reilly stated that tests of all circuits and inspections were continued during the day following the accident and no defects were found; all signal apparatus was found to be working properly.

Traveling Air Brake Instructor Meincke stated that the train involved consisting of 8 cars, with the engine throttle partly open and the train traveling at a speed from 50 to 55 miles per hour, would have been stopped within 800 or 900 feet by an emergency application of the air brakes; if it were traveling at a speed of 40 miles per hour it would have been stopped within 600 or 650 feet by an emergency application.

Observations of Commission's Inspectors

The Commission's inspectors in conjunction with the railroad officials conducted tests and inspections of the signal apparatus. The control circuits involved in the operation of signal 453 were installed in accordance with the plans furnished and the signals responded and operated as intended. The back-locking feature of the interlocking insures that all conflicting signals in a specific route are in their most restrictive position before the desired route can be set up.

Discussion

The investigation disclosed that as Extra 2125 approached the home signals governing its movement, the signals were changed to permit Extra 2125 to make the cross-over movement from track 3 to track 4 and thence to the yard, which, according to the statement of the towerman, was about 11:25 p. m.; the route was properly lined for this movement. With this route so lined signals 36L and 28L, governing movements on track 1, should display red-over-red aspects, and signal 453 should display a green-over-yellow aspect, indicating that a train must prepare to stop at next signal and if exceeding medium speed it must at once reduce to that speed, but it must not exceed a speed of 30 miles per hour. In addition, there was a 40-mile-per-hour speed board located 238 feet west of signal 453.

The engineman of Second 9 stated that he received a green-over-green aspect at signal 453, at which time he was operating his train at a speed of 50 to 55 miles per hour. After passing that signal he eased off on the throttle, reducing the speed to 45 miles per hour, and when the road foreman of engines, who was on the left side of the cab, called the red aspects of signal 36L, he immediately applied the air brakes in emergency and about that time the engine was passing the signal. The fireman was on the deck approaching Port Morris Junction and neither saw the signal indications nor heard them called. The road foreman of engines stated that when the engineman called the clear indication at signal 453, he answered him, but he did not see the signal. He then left his seatbox to get a drink of water and after resuming his place on the left side of the cab he saw the red aspects of signal 36L, at which time they were close to the signal and traveling at a speed of about 50 miles per hour. The engineman had not reduced speed, but had continued to use steam after passing signal 453. The conductor stated that the speed was 50 miles per hour or more when he felt the emergency application of the air brakes. On the other hand, an approach indication at signal 453 was seen by three members of the crew of the engines of Extra 2125 as they passed. The conductor, who was on the left side of the cupola of the caboose, saw the green-over-yellow aspect, and the flagman of Second 9 observed its approach indication shortly after the accident.

The back-locking feature of the interlocking insures that all conflicting signals in a specific route are in their most restrictive positions before the desired route can be set up; thus the home signals governing track 1 would display stop indications and signal 453 would display an approach indication. Tests conducted after the accident demonstrated that the interlocking functioned as intended and no defects in the signals were found.

According to the statements of both the engineman of Second 9 and the road foreman of engines, after leaving Chester Junction, 4.48 miles east of the point of accident, the road foreman of engines left his seatbox on the left side of the cab to converse with the engineman relative to the matter of stopping for water, and it is possible that this conversation may have taken place approaching signal 443, located 4,500 feet east of signal 453, which possibly distracted the engineman's attention to the extent that he may have mistaken this signal for signal 453, the physical characteristics approaching both signals being alike, and then failed to observe the latter signal. If the road foreman of engines, who was on the left seatbox, had observed the signals instead of getting a drink of water as stated by him, especially since the fireman was on the deck, he no doubt would have seen the approach indication of signal 453, and he could have seen the stop indication of signal 36L at a greater distance than he did in this instance; this signal can be seen a distance of 789 feet, yet he did not see it until the engine had practically reached it. If the engineman had been operating his train in compliance with the 40-mile-per-hour speed restriction, even though he failed to observe signal 453 properly, and had he been warned immediately, since the accident occurred 436 feet west of signal 36L he could no doubt have averted the accident as he would have had a distance of 1,225 feet in which to stop the train.

Conclusion

This accident was caused by failure to observe and to obey signal indications governing the movement of Second 9.

Respectfully submitted,

W. J. PATTERSON

Director.