Inv-2416

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT OF THE DIRECTOR

BUREAU OF SAFETY

ACCIDENT ON THE

PENNSYLVANIA RAILROAD

ODENTON, MD.

FEBRUARY 28, 1940

INVESTIGATION NO. 2416

SUMMARY

Inv-2416

Railroad:	Pennsylvania	
Date:	February 23, 1940	
Location:	Odenton, Md.	
Kind of accident:	Rear-end collision	
Trains involved:	Passenger	: Passenger
Train numbers:	532	: 422
Engine numbers:	4848	: 4801
Consist:	9 cars	: 3 cars
Speed:	Standing	: 6-18 m. p. h.
Operation:	Automatic block and cab-signal system	
Track:	Double; tangent; 0.08 percent ascending grade northward	
Weather:	Cloudy	
Time:	5:46 p. m.	
Casualties:	11 injured	
Cause:	Failure to furnish adequate flag protection for No. 532, and failure to operate No. 422 in accordance with signal indications.	

To the Commission:

On February 28, 1940, there was a rear-end collision between two passenger trains on the Pennsylvania Railroad near Odenton, Md., which resulted in the injury of seven passengers, three dining-car employees, and one train-service employee off duty.

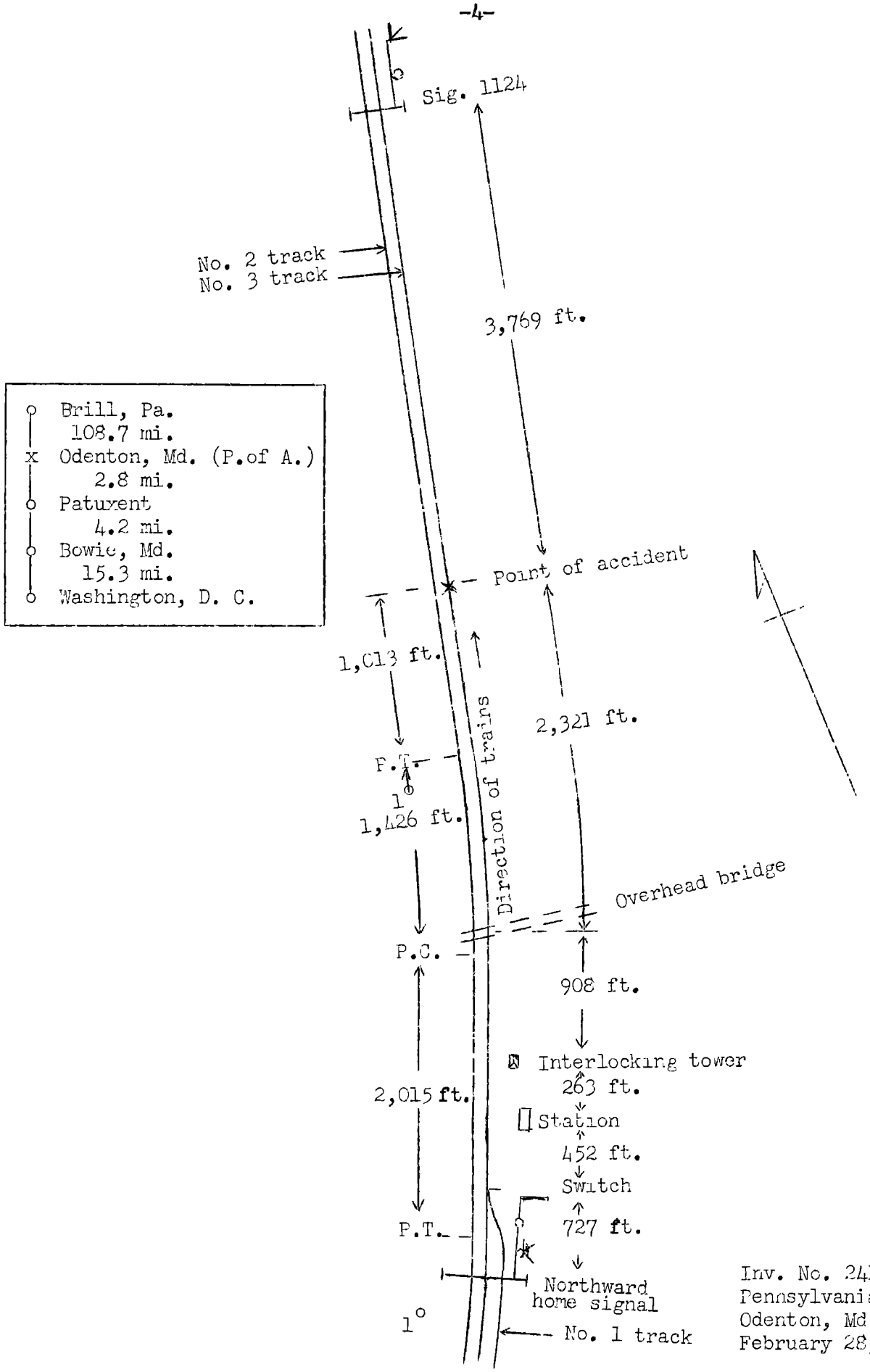
Location and Method of Operation

This accident occurred on that part of the Maryland Division which extends between Washington, D. C., and Brill, Pa., a distance of 131 miles. This line is equipped with an overhead catenary system for electric propulsion of trains. In the immediate vicinity of the point of accident this is a double-track line over which trains are operated by an automatic block and cab-signal system, the indications of which supersede time-table superiority. The northward and the southward main tracks are designated as track No. 2 and track No. 3, respectively. The accident occurred on track No. 2 at a point 3,229 feet north of Odenton interlocking tower. Approaching the point of accident from the south there are, in succession, a tangent 2,015 feet in length, a 1° curve to the left 1,426 feet in length, and a tangent extending 1,013 feet to the point of accident and some distance beyond. The grade, which varies between 0.06 and 0.78 percent, is ascending northward, and is 0.08 percent at the point of accident.

Odenton passenger station is located east of the tracks and 263 feet south of the interlocking tower. Track No. 1, a northward freight track, parallels track No. 2 on the east and converges with it at a point 452 feet south of the station; the northward home-signal bridge is located 727 feet south of the switch where these tracks converge; this switch is controlled and operated from Odenton interlocking tower.

Operating rules and time-table special instructions provide in whole or in part as follows:

> 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.
>
> * * *



Inv. No. 2416
Pennsylvania R. R.
Odenton, Md.
February 28, 1940

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 thrown off at proper intervals.

* * *

According to rules 276, 278 and D2104, the last of which is a modification of rule 283, cab-signal indications and their corresponding names are as follows:

	Indication	Name
276.	Stop-then proceed in accordance with rule * * * 660.	Stop-and-proceed-signal.
278.	Proceed at not exceeding 15 miles per hour with caution prepared to stop short of train or obstruction.	Caution-slow-speed-signal.
D2104. (Rule 283 modified)	A train exceeding one-half its maximum authorized speed here must at once reduce to not exceeding that speed. Approach next signal prepared to stop.	Approach-signal.

Rule 660 reads as follows:

(Double, three, or more tracks.) In Automatic Block System territory, when a train is stopped by a Stop-and-Proceed-signal that governs its movement into or within an interlocking, it may proceed at once not exceeding 15 miles per hour to the next signal expecting to find a train ahead * * * .

Special instruction D2513 of the current timetable provides as follows:

D2513. * * *

6. * * * Cab-signal indications do not supersede Fixed-signal indications, except when Cab-signal changes to a more restrictive or a more favorable aspect after passing a Fixed-signal.

7. If after passing a Fixed-signal, the Cab-signal aspect changes from Caution-Slow-Speed (Rule 278) to a more favorable aspect, speed must not be increased until the train has run its length.

* * *

The maximum authorized speed for passenger trains is 80 miles per hour.

It was daylight but the weather was cloudy at the time of the accident, which occurred about 5:46 p. m.

Description

No. 532, a north-bound passenger train, with Conductor Cook and Engineman Sweeny in charge, consisted of electric engine 4848, four Pullman sleeping cars, one dining car, one coach, one passenger-baggage car, one deadhead cafe-coach, and one loaded baggage-express car, in the order named; all cars were of steel construction. This train departed from Washington, 22.3 miles south of Odenton, at 5:20 p. m., according to the train sheet, on time, passed Odenton at 5:41 p. m., on time, and, because the brakes on the fifth car did not release, stopped on track No. 2 with its rear end standing 3,229 feet north of Odenton interlocking tower, where it was struck by No. 422.

No. 422, a north-bound passenger train, with Conductor Amidon and Engineman Wilson in charge, consisted of electric engine 4801, of the 4-6-6-4 type, two coaches, and one passenger-baggage car, in the order named; all cars were of steel construction. This train departed from Washington at 5:05 p. m., according to the train sheet, on time, and at Odenton stopped on track No. 1 at the home signal, which displayed a stop-then-proceed indication, then moved through the switch to track No. 2, at which point the cab-signal aspect was caution-slow-speed. The train stopped at Odenton station, departed from that point at 5:45 p. m., 2 minutes late, and, while moving at a speed variously estimated to have been between 6 and 18 miles per hour, collided with No. 532.

No equipment was derailed. Engine 4801, of No. 422, was badly damaged at the front end. As a result of the impact the rear end of the rear car of No. 532 was crushed inward at the top a distance of about 2 feet, the front coupler knuckle of the fifth car was broken, and the sixth car sustained slight damage.

Summary of Evidence

Engineman Sweeny, of No. 532, stated that a terminal air-brake test was made at Washington and the brakes were reported as functioning properly. He made a running test by means of a 17 or 18-pound brake-pipe reduction soon after departing and thought the brakes released properly. His train, moving on track No. 2, passed No. 422, moving on track No. 1, at Patuxent, 2.8 miles south of Odenton. When the train was approaching Odenton the speed was about 77 or 78 miles per hour and the fireman told him there was a hot journal on a car; he stopped the train as quickly as possible, in keeping with safety and smoothness, at a point about 3/4 mile north of Odenton. Immediately after the train stopped, the fireman started toward the rear end of the train. Engineman Sweeny said that he released the train brakes, applied the independent brake, and went back to inspect the train. Inspection disclosed that the brake shoes on the middle pair of wheels of the front truck of the dining car had been sticking. Finding that the brake shoes moved freely on the wheels he decided to proceed. After he walked to within about 2 car lengths of his engine the collision occurred. He neither observed the location of his flagman nor heard the following train as it approached. En route from Washington the cab-signal indication, which was clear, corresponded with wayside signal indications. Approaching the point where his train was stopped, he observed that automatic signal 1124 displayed a clear indication. He said that it was daylight and the weather was cloudy, but visibility was not appreciably restricted at the time of accident. His train stopped at 5:45 p. m. and he estimated that the accident occurred about 3 or 4 minutes later.

Fireman Mason, of No. 532, corroborated the testimony of Engineman Sweeny.

Conductor Cook, of No. 532, stated that en route from Washington he and the flagman collected transportation in the rear portion and the front portion of the train, respectively. They met about the rear end of the fifth car or the front end of the sixth car, and at that time the air brakes were applied and the train stopped at 5:42 p. m. He said that he saw the flagman start back immediately to provide flag protection. An inspection disclosed that the brake shoes on the front truck of the dining car had been sticking, but, since the brake shoes could be moved on the wheels, it was decided to proceed. He was standing on the ground at the left side of the train near the sixth car and saw his flagman waving stop signals with a lighted fusee from a point about 500 feet to the rear of his train. He was not apprehensive that No. 422 would not stop until after it passed the flagman. He did not hear the engine whistle of No.

422 sounded nor see fire flying from the wheels. After the accident he observed that the front coupler knuckle of the fifth car was broken and the fourth and fifth cars were separated about 6 feet. The weather was cloudy but visibility was not restricted. He stated that he had not arranged for the baggagemaster to afford flag protection while the flagman collected transportation but he assumed that the baggagemaster would protect if necessary. He thought his train was stopped about 3 or 4 minutes before it was struck by No. 422.

Baggagemaster Carter, of No. 532, stated that when the train stopped the flagman came back to the baggage end of the third car from the rear of the train and obtained his flagging equipment and immediately started back to provide flag protection. The baggagemaster then examined the rear two cars and proceeded forward. He saw the flagman from 300 to 375 feet back of his train, with a lighted fusee in one hand and a red flag in the other, flagging an approaching train which, at that time, was about 2,300 feet distant. Baggagemaster Carter said that he thought the approaching train would stop before it would collide with his train, as there was ample distance for stopping. He did not see fire flying from the brake shoes or the wheels of No. 422.

Flagman Farr, of No. 532, stated that he assisted in collecting tickets and when that work was completed he met the conductor at the middle of the train. At that time the air brakes became applied and the train stopped at 5:42 p. m. Knowing that No. 422 was following closely, he obtained day flagging equipment from the third car from the rear end and started back immediately at the right side of track No. 2. When he was about 225 feet to the rear of his train he saw an approaching train, which he thought was about 1/2 mile distant. He waved stop signals with the red flag but, receiving no response, he continued toward the approaching train, and when it was about 600 or 675 feet distant he lighted a fusee; he waved the fusee with his right hand and the flag with his left hand. He did not place torpedoes on the rails because he was anxious to get back as far as possible. His flagging signals were not acknowledged by the engineman of the approaching train. When he realized that the train was not stopping he began to shout and, in order to avoid being struck, stepped away from the track on the engineman's side at a point 375 to 450 feet to the rear of his own train. When No. 422 passed him its speed was about 20 miles per hour; the wheels were not sliding nor was fire flying from the brake shoes. When the engine was from 120 to 150 feet from his train he saw fire flying from the brake shoes, and he estimated that the speed was reduced to 15 or 17 miles per hour when the impact occurred. The weather was cloudy but visibility was

good. He said that he did not see anyone in the engine cab of No. 422 but he thought that his shouting attracted the engineman's attention. When No. 422 stopped, its rear end was about 120 feet north of the point where he stood. He said that his train had been stopped about 3-1/2 minutes before the accident occurred.

Engineman Wilson, of No. 422, made several statements. In substance his testimony was to the effect that at Washington he tested the cab-signal equipment and the sand apparatus; both functioned properly. A terminal air-brake test was made at Washington and a running air-brake test was made soon after leaving; the brakes functioned properly. The cab-signal indications corresponded with wayside-signal indications en route to Odenton. At Bowie, 7 miles south of Odenton, his train overran the usual stopping point about 1/2 car length; however, he thought this was because it was his first trip on this run in about 1 year and because his train approached the station too rapidly. His train was moving on track No. 1 when No. 532, which was on track No. 2, overtook and passed it in the vicinity of Patuxent. At Odenton the home signal displayed a stop-then-proceed indication; he stopped the train and then it proceeded from track No. 1 to track No. 2 and stopped at the station. He said that leaving Odenton he was in his usual position in the cab. The fireman was in the steam-heat boiler-room. At this point the cab signal displayed a caution-slow-speed indication. He knew that his train was closely following No. 532. He stated that when his engine was in the immediate vicinity of an overhead bridge, located 1,171 feet north of the station, the cab-signal indication changed from caution-slow-speed to approach but he did not see the change occur. He said that he assumed the train ahead was out of the block, and the track was clear to the next signal. In one statement he said that after his train moved about its length he increased the speed from about 15 miles per hour to 25 miles per hour; however, in another statement he said that the speed was increased to between 30 and 40 miles per hour. He did not observe the speedometer as he was closely observing the ammeter indication to avoid overheating the motors. He did not again observe the cab-signal indication until after the accident occurred. The fireman came out of the steam-heat boiler-room when the engine was about 2,160 feet north of Odenton interlocking tower. Engineman Wilson said that after his train rounded the curve and reached the tangent, which extended 1,013 feet to the standing train, he saw the flagman and a lighted fusee; also he saw the markers of the train ahead. At that time his fireman called a warning. Engineman Wilson said that he did not have sufficient time in which to acknowledge the flagman's stop signals. In another statement he said the fusee was sticking in a tie at the right

side of the track about 3 or 4 coach lengths to the rear of No. 532 and that he did not see a flagman. When about 9 to 12 coach lengths from No. 532 he applied the air brakes in emergency, disengaged the pantograph, opened the sanders, and soon afterward, while moving at a speed of 6 or 10 miles per hour, his engine struck the rear end of No. 532. In one statement he said that the brakes were applied in emergency when his train was 10 or 12 coach lengths to the rear of No. 532; in a second, when at a distance of 7 coach lengths; in a third, when at a distance of 9 coach lengths; in a fourth, when at a distance of 9 or 10 coach lengths, and in still another statement he said that probably he was closer to the preceding train and was moving at a rate of speed greater than he realized. At first he thought that his train would stop but it felt as though the wheels locked and the engine slid into the train ahead. He was not certain that the air brakes were effective at the time of accident. He was certain that the cab-signal indication changed from caution-slow-speed to approach after his train left Odenton station. He thought that if the flagman had been stationed where he could provide flag protection immediately or if the baggagemaster had assumed the flagman's duties, flag protection could have been provided at a distance farther to the rear of No. 532, and the added distance would have been ample in which to stop his train short of the train ahead.

Fireman Frank, of No. 423, stated that a terminal air-brake test was made at Washington and the brakes functioned properly en route to Odenton. No. 532 passed his train in the vicinity of Patuxent. When his train was leaving Odenton he observed that the cab signal displayed a caution-slow-speed indication; he did not again observe the cab-signal indication prior to the accident. He left the forward cab to attend the steam-heat boiler and did not return to his seat-box until his engine had nearly rounded the curve preceding the tangent on which the accident occurred. When his train was about 11 to 12 coach lengths from No. 532 he saw the flagman, the train ahead, and a lighted fusee on the track; the flagman was about 3 or 4 coach lengths behind No. 532. He called a warning to the engineman, who applied the air brakes in emergency, and at this time the speed was about 25 or 30 miles per hour; the speed had been reduced to 7 or 9 miles per hour when the collision occurred. He thought that his train would stop short of No. 532 but the air brakes did not seem to respond properly. He said that on this run the cab-signal indication usually changes from caution-slow-speed to approach when the engine is in the vicinity of the overhead bridge north of Odenton. In one statement he said that No. 532 was 11 or 12 coach lengths distant when the brakes on his train were applied; in a second statement, when at a distance of 8 or 9 coach lengths; and in a third statement, when at a distance of 9 or 10 coach

lengths. He said that the engineman appeared to be normal. The weather was cloudy but visibility was good. The weather was not cold; however, he could not explain the necessity of tending the steam-heat boiler, especially while his train was moving under a restrictive signal indication on a curve to the left. He understood that the rules required him to maintain a lookout ahead.

Conductor Amidon, of No. 422, stated that he was in the second car approaching the point of accident and the speed was 18 to 20 miles per hour when the brakes became applied in emergency; soon afterward the collision occurred at 5:47 p. m. He thought that the speed was about 15 miles per hour at the time of accident. Immediately after the accident he saw the flagman of No. 532 about 3 or 4 car lengths to the rear of No. 422. He thought that the emergency air-brake application was effective; however, after the accident the engineman said that the brakes did not hold properly. Prior to departure from Washington the engineman appeared normal. Conductor Amidon said that it was customary for No. 422 to run on track No. 1, Bowie to Odenton, to permit No. 532 to pass.

Baggagemaster Seitz, of No. 422, stated that when his train was approaching the point of accident he was in the baggage end of the third car. He felt the air brakes become applied in emergency and, after his train moved about its length, he looked out the right side-door and saw the flagman of No. 532 with a lighted fusee in his hand; also, he heard the flagman shouting. His train continued a distance of about twice its length before the impact occurred; at this time the speed was about 10 or 12 miles per hour. After the accident Engineman Wilson told him that the cab-signal indication had changed to approach when the engine was in the vicinity of the overhead bridge and that the train slid into the rear end of No. 532; the engineman pointed out the marks on the rail. Baggagemaster Seitz said that in his opinion the brakes functioned properly.

Flagman Wolter, of No. 422, stated that when his train was approaching the point of accident the speed was about 25 miles per hour. He was on the south platform of the second car when the air brakes became applied in emergency. About 20 or 30 seconds later the impact occurred, and at that time the speed was about 15 to 18 miles per hour. About 30 seconds after the accident, as he was going back to protect, he saw the flagman of No. 532 at a point about 2 car lengths to the rear of No. 422, carrying a lighted red fusee.

Telegraph and Signal Maintainer Disney, at Odenton, stated that he arrived at the scene of the accident about 6:15 or 6:20

p. m. At that time he observed the cab signal of motor 4801 displaying a caution-slow-speed indication. Engineman Wilson told him that after the engine passed the overhead bridge the cab-signal indication changed to approach, that he increased speed, and that when the engine reached a point about 3 car lengths from the rear end of No. 532, he saw a fusee and applied the air brakes in emergency.

Road Foreman of Engines Wilcox stated that he arrived at the scene of the accident about 7:20 p. m. A damaged air pipe on engine 4801 was repaired and then engine 4788 was coupled to the rear of the train for movement to Baltimore. An air-brake test was made and the brakes functioned properly. The engineman and the fireman of No. 422 appeared normal.

Engineman Mayes, of electric engine 4788, stated that as his engine passed the home signal on track No. 1, which displayed a stop-then-proceed indication, the cab-signal indication changed from approach to caution-slow-speed. His engine moved northward on track No. 2 and, according to the train sheet, passed Odenton tower at 7:32 p. m., this was the first movement over this route after No. 422 passed. The cab signal continued to display a caution-slow-speed indication to the point where his engine was coupled to the rear of No. 422. His engine pushed No. 422 to Baltimore and the air brakes functioned properly en route.

Fireman Thompson, of engine 4788, corroborated the statement of Engineman Mayes.

Supervisor of Telegraph and Signals Krylow stated that he arrived at Odenton about 7:15 p. m. and inspected the signals and track circuits. This inspection failed to disclose any defect which might have caused a false cab-signal indication.

Passenger Trainmaster Babcock stated that regardless of the place in a train at which a flagman is located at the time when flag protection is required, although a baggageman may be nearer to the rear end, the flagman and the conductor are responsible for proper protection of a train.

Observations of the Commission's Inspectors

The Commission's inspectors observed that as a result of the accident the brake-pipe and the signal-whistle pipe at the front end of engine 4801 were broken off. After a temporary repair was made, a test disclosed that the engine brakes and the sanding apparatus functioned properly. A test of the air-brake equipment on the three cars of No. 422 disclosed that the air brakes functioned properly.

Subsequent to the accident a series of tests was conducted at Odenton; the three cars which were in the train of No. 422 on the day of the accident, and electric engine 4806, which was of the same type as engine 4801, were used. The air-brake equipment of engine 4806 was adjusted to perform its functions similar to those of engine 4801; the brake-cylinder pistons were adjusted to the same travel as that on the engine involved. The weather conditions were similar to the weather conditions on the day of the accident. The tests were as follows:

FIRST TEST

A shunt was applied to the track circuits on track No. 1 for test purposes. A torpedo was placed on the rail on tangent track at a point 1,071 feet south of the point of accident, or at the place the engineman of No. 422 stated that he first saw the rear end of No. 532 on the day of the accident. The test train departed from Odenton station on track No. 2 and attained a speed of 15 miles per hour at the point the engineman stated that he received a more favorable cab-signal indication. Then the speed was increased to 28 miles per hour and, when the torpedo was exploded, the brakes were applied in emergency and the train stopped in a distance of 237 feet, or 834 feet south of the point of accident; the elapsed time was 13-2/5 seconds. The wheels slid the last 18 inches only; a shower of sparks was emitted from the brake shoes and the wheels.

SECOND TEST

The track-circuit shunt was in place on track No. 2. The train departed from Odenton station and attained a speed of 45 miles per hour at a point 1,071 feet south of the point of accident. The brakes were applied in emergency and the train stopped in a distance of 742 feet, or 329 feet south of the point of accident; the elapsed time was 17-3/5 seconds. The wheels slid the last several feet; a shower of sparks was emitted from the brake shoes and the wheels.

The cab-signal displayed a caution-slow-speed indication at all times during the tests.

From the right side of a north-bound engine the rear end of a train standing at the point of accident could be seen a distance of 1,440 feet.

Inspection and test of the track circuits at Odenton disclosed that all values were within the prescribed limits.

Inspection and test of the cab-signal apparatus on engine 4801 disclosed it to be within the prescribed limits, except the

pick-up, which was slightly below the railroad's prescribed limits; however, tests failed to disclose any condition which might result in a false indication being displayed by the cab signals.

Discussion

According to the evidence, because of brakes on the fifth car sticking, No. 532 stopped about 5:42 p. m., and about 5:46 p. m. its rear end was struck by No. 422 at a point 3,229 feet north of Odenton interlocking tower.

The flagman of the preceding train had been assisting his conductor in collecting tickets and was at the front end of the fourth car from the rear end of the train when he felt the brakes become applied. He proceeded to the third car from the rear, obtained his flagging equipment, and alighted to provide flag protection. He was aware that No. 422 was following closely, and, in his anxiety to proceed to the rear a sufficient distance to provide adequate stopping distance for a following train, he did not pause to place torpedoes on the rails. When he had proceeded about 225 feet to the rear of his train he saw the following train about 1/2 mile distant. He waved a red flag, but, receiving no acknowledgment, he lighted a fusee. He continued toward the approaching train and had reached a point from 375 to 450 feet to the rear of his train when No. 422 passed him at a speed which he estimated at 20 miles per hour. The flagman said that there was no indication of brakes being applied when the engine passed him, and he could not see the engineman; however, when the engine had passed about 120 feet beyond him, fire started to fly from the wheels and the brake shoes of the cars. He estimated that the speed of the train was about 15 or 17 miles per hour at the time of collision. Under the rules the flagman was required to drop off lighted fusees when the speed of his train was reduced after it passed Odenton. In this instance, however, the flagman was 2 coach lengths away from his flagging equipment, and, by the time he was able to obtain it, the train had stopped. The baggagemaster was in the third car from the rear of the train and could have provided flag protection immediately after the train stopped. The conductor said that he had not instructed the baggagemaster to provide flag protection but he assumed the baggagemaster would protect if necessary; however, the passenger trainmaster said that the conductor and the flagman were responsible for the protection of their train. If a fusee had been dropped off as soon as the speed of the preceding train was reduced, undoubtedly the engineman of the following train would have been warned in sufficient time to take action to avert the accident. The evidence is to the effect that the flagman had at least 3 minutes available in which to provide protection; if the flagman had been stationed

at the rear of his train, had proceeded to the rear as rapidly as possible under the circumstances, and had placed torpedoes on the rail, it is probable that the engineman of the following train would have been warned in sufficient time to avert the accident. Tests conducted subsequent to the accident disclosed that a train similar to the following train, moving at a speed of 45 miles per hour, could be stopped as a result of an emergency application of the brakes in a distance of 742 feet.

The engineman of No. 422 said that it was daylight and visibility was good. When the train left Odenton he was operating under a stop-then-proceed home-signal indication and a caution-slow-speed cab-signal indication, both of which required him to proceed at not exceeding 15 miles per hour and to look out for train or obstruction. He knew that No. 532, moving on track No. 2, had passed Odenton just prior to the time his train entered track No. 2. According to his statement, at a point about 1,170 feet north of Odenton, on a curve to the left, the cab signal changed to an approach indication, which permitted the speed to be increased to one-half the maximum authorized speed or 40 miles per hour and he assumed that No. 532 had passed the next signal in advance. He did not again observe the cab-signal indication, as he was engaged in watching the ammeter gauges because he was somewhat apprehensive of overheating the motors. The fireman said that when his train departed from Odenton he left his usual position in the cab to attend the steam-heat boiler and did not see the cab-signal indication change, and he did not observe that No. 532 had stopped north of Odenton. The fireman said that he knew the rules required him to maintain a lookout ahead but he thought that the boiler required immediate attention. When he returned to the cab he observed No. 532 standing at a distance of 8 or 12 coach lengths, and its flagman about 3 or 4 coach lengths to its rear. He immediately called a warning to his engineman, who placed the brake-valve in emergency position. The engineman said that the brakes did not seem to hold as well in this instance as they had en route from Washington to Odenton. Other members of the crew said that the brakes had functioned properly at all times en route. In subsequent tests the brakes functioned properly.

During the investigation the engineman seemed somewhat confused as to what had occurred. In one statement he said that just as his engine entered the tangent on which the accident occurred, he saw the flagman and a fusee; in another statement, he said that he did not see the flagman, and that the fusee was sticking in a tie about 4 coach lengths to the rear of the first train. He stated that at the time he first saw the preceding train the speed of his own train was 25 miles per hour, but later stated that the speed was 30 to 40 miles per hour. In his

several statements he said that he made an emergency application of the brakes when his train was at a point which he variously estimated at from 7 to 12 coach lengths distant from the first train; and in another statement, he said that probably he was closer to the first train and moving at a rate of speed greater than he realized. The flagman of the first train said that the brakes on the second train were not applied when it had reached a point within 375 to 450 feet of the first train. The variation in the engineman's statements indicates that he was confused as to the conditions existing between Odenton and the point of accident. Since no one except the engineman said the cab signal displayed any indication less restrictive then caution-slow-speed, between Odenton and the point of accident; since the engineman observed the cab signal only momentarily; since northbound trains entering track No. 2 at Odenton receive a less restrictive indication at the point at which the engineman stated that he received an approach indication, unless there is a train ahead in the same block; and since exhaustive tests conducted subsequent to the accident did not disclose any defect in the cab-signal system that would cause a false indication, it appears probable that the engineman of the second train was confused also concerning the cab-signal indication changing from caution-slow-speed to approach.

Conclusion

This accident was caused by failure to furnish adequate flag protection for No. 532, and by failure to operate No. 422 in accordance with signal indications.

Respectfully submitted,

S. N. MILLS,

Director.