

August 19, 1913.

In re investigation of Accident on the
Pennsylvania Railroad at Tyrone, Pa.,
on July 30, 1913.

On July 30, 1913, there was a rear-end collision between two passenger trains on the Pennsylvania Railroad at Tyrone, Pa., resulting in the death of one employee and the injury of 126 passengers, 20 employees, 5 postal clerks and 2 Pullman employees.

After investigation of this accident the Chief Inspector of Safety Appliances reports as follows:

The trains involved in this collision were westbound passenger trains No. 15, en route from Philadelphia to Chicago, and No. 13, en route from Philadelphia to St. Louis. Train No. 15 consisted of engine No. 588, one postal car, one baggage car, four coaches, one dining car, and one Pullman parlor car, all the cars in this train being of steel construction. Train No. 13 consisted of engine No. 3411, one postal car, two postal storage cars, 2 coaches, one Pullman parlor car, one dining car, and one private car. All the cars in this train were of steel construction except the private car, which was of wooden construction.

Train No. 15, with Conductor Cook and Engineman Miller in charge, left Harrisburg at 11:41 a. m., one minute late, and arrived at Tyrone at about 2:34 p. m., nine minutes late. Train No. 15 stood at the station at Tyrone for about five minutes, unloading and loading passengers and baggage, and just as it had started to leave that station it was struck by train No. 13. At the time of the accident the weather was clear.

Train No. 13, with Conductor Black and Engineman Funk in charge, left Harrisburg at 12:29 p. m., four minutes late. It passed Q Y tower, 5.6 miles from Tyrone, at 2:31 p. m., and F R tower, one mile from Tyrone, at 2:37 p. m. The schedule time of this train at Birmingham, a station 1-1/2 miles east of F R tower, is 2:37 p. m., and as that is the time train No. 13 passed F R tower it is evident that this train passed Birmingham approximately 2 minutes ahead of time. It was scheduled to pass Tyrone at 2:41 p. m., approximately 2 minutes after the collision occurred. Engineman Funk was killed in the collision.

At the place where this accident occurred the Pennsylvania Railroad is a four-track road, and for some distance east of Tyrone station two tracks of the Tyrone Division parallel the four main tracks. On the main line track No. 1

is used for eastbound freight trains, track No. 2 for eastbound passenger trains, track No. 3 for westbound passenger trains, and track No. 4 for westbound freight trains. Automatic block signals of the three-position, upper-quadrant, alternating current, normal clear type govern the operation of trains over this section of railroad, the signals being mounted directly over the tracks which they govern on signal bridges extending across all four tracks. An interlocking plant is installed at F R tower, and just east of this tower there is a home interlocking signal of the semi-automatic type, governing train movements over the crossover switches. Automatic block signal No. 2211 is located about 1050 feet west of F R tower, and automatic block signal No. 2219 is located approximately 3800 feet west of signal No. 2211, and 1150 feet east of Tyrone passenger station.

When a train approaching from the east passes the semi-automatic home signal just east of F R tower, that signal assumes the stop position, and its position cannot be changed until the train has passed block signal No. 2211; then if the lever in the tower is in caution or the clear position, the semi-automatic signal, being controlled both by the lever in the tower and by track circuits, goes to the caution position, automatic signal No. 2211 then being in the stop position; and when the train passes automatic signal No. 2219, that signal goes to the stop position, signal No. 2211 indicates caution, and the semi-automatic signal goes to the clear position.

Supervisor of Signals Post stated that these automatic block signals were put into service on June 13, 1913, and had not failed to work properly since that date.

Signalman Khrisman, who was on duty at F R tower at the time of this accident, stated that when train No. 13 approached the semi-automatic signal was in the clear position; as the train passed, the signals operated properly, the semi-automatic signal indicating clear and automatic signal No. 2211 indicating caution when this train came to a stop just east of Tyrone passenger station; these were the indications displayed by these signals when train No. 13 passed them. From F R tower he could not see signal No. 2219.

Signalman Khrisman's statement regarding the position of the semi-automatic signal at F R tower and automatic signal No. 2211 is corroborated by statements of six members of a wrecking train crew, two of whom were in F R tower at the time train No. 13 passed, two on the engine of the wrecking train on a siding near F R tower, and two on the ground near the tower. According to the statements of these men, train No. 13 was running at 35 or 40 miles per hour and the engineman was using steam when the train passed under the caution signal.

Sectional Maintainer Allison who was at F R tower when No. 13 passed stated that the automatic signal west of F R tower governing track No. 3 was in the caution position, and the automatic signal governing track No. 4 was in the clear position. He stated that these signals were in good condition and were operating properly.

Signal Maintainer Sherry stated that he was walking from F R tower toward signal bridge No. 2211 when train No. 13 passed; the signal governing track No. 3 was in the caution position, and the signal governing track No. 4 was in the clear position. He thought the train was running at an unusually high rate of speed; he estimated the speed at 45 or 50 miles per hour, and said the engineer was using steam when the train passed.

Traveling Engineman Smith of the Tyrone Division stated that he was on the engine of No. 53 between Tyrone station and signal bridge 2219; he could see the rear end of train No. 13, and he saw the flagman of that train back near the mail chute at the end of the station platform; the flagman was called in and just as he reached his train No. 13 whistled. At that time the signal governing track No. 3 was in the stop position, and he supposed train No. 13 was on track No. 4 until it was only a short distance away; he then saw that No. 13 was on track No. 3 and he gave a hand signal for that train to stop; he saw the engineer of that train on his seatbox and leaning out of the cab window. He thought the speed of the train was about 30 miles per hour when it passed him. As this train approached he saw the flagman of train No. 15 run back again, signaling train No. 13 to stop.

Engineman Gibbs of Tyrone Division train No. 53 stated that he also gave stop signals by hand when train No. 13 approached, and as this train reached a point right opposite him, he shouted to the engineer who turned around and looked to one side and then turned back again. He thought the train was running 25 or 26 miles per hour and he did not think the brakes were applied.

Approaching Tyrone from the east the track curves toward the south near signal No. 2211 and then curves toward the north about half way between signals 2211 and 2219. Beginning a short distance east of signal No. 2219 and extending beyond Tyrone passenger station there is a six-degree curve toward the south, and there is a slight ascending grade for westbound trains. Signal No. 2219 can first be seen from the left side of an engine approaching from the east at a point 3957 feet distant and is visible for a distance of 441 feet; it is then obscured until a point is reached 1251 feet from the signal. The rear end of train No. 15 could be seen from the left side of the engine of train No. 13 when it was 592 feet distant. Signal No. 2219 can first be seen from the right

side of a locomotive approaching from the east at a point 3664 feet distant, and is visible for a distance of 1601 feet. It is then obscured until a point is reached 402 feet from the signal.

Assistant Road Foreman of Engines Miller, who was riding on the engine of train No. 13 at the time of this accident, stated that as the train approached F R tower the home signal just east of the tower was in the clear position and automatic signal No. 2211 just west of the tower was also in the clear position. He stated that he was the first to see this signal and he called "White"; the fireman then looked out and called "White", and when a point was reached where the engineman could see the signal he called "White" also. There was a freight train on track No. 2 and Miller stated that he dropped his head to avoid getting cinders in his eyes; he looked up again when the engineman whistled for a crossing, the engine then being only about two car lengths away from signal No. 2219, and immediately he called to the engineman that the signal was red. He then saw the flagman of No. 15 and called to the engineman. He stated that the engineman did not shut off steam until he called the red signal, and he thought the speed of the train was then about 40 miles per hour. After he saw the flagman of train No. 15 he jumped down with the intention of applying the brake himself, but he saw the engineman move the brake valve handle over; however the brakes seemed to be slow in taking hold, and the speed of the train was not materially reduced when the collision occurred. He thought the collision might have been averted had the brakes been applied in emergency when he first saw signal No. 2219 in the stop position.

Fireman Barton of train No. 13 stated that the semi-automatic signal just east of F R tower and automatic signal No. 2211 were both in the clear position, but automatic signal No. 2219 was in the danger position; when he called the danger signal the engineman made an emergency application of the brakes. He estimated the speed of the train at that time at about 40 miles per hour.

Conductor Black of train No. 13 stated that he did not notice any application of the brakes before the collision occurred. He was just entering the fourth car and stated he would have very readily noticed an application of the brakes had one been made.

Rear Brakeman Bowers of train No. 13 stated that he did not notice any application of the brakes before the collision occurred. He thought the train was running at a speed of 30 or 35 miles an hour at the time of the collision.

Flagman Wallace of train No. 15 stated that when his

his train arrived at Tyrone he assisted passengers off and on the train; he then went to the rear end of the train, got torpedoes and a flag and started back to protect the train. He had not quite reached the end of the station platform, about 500 feet from the rear end of his train, when signal recalling him was sounded. He then returned to his train and just as it started he heard train No. 13 approaching. He immediately started to run back and signalled this train to stop, first on the engineman's side and then on the fireman's side, and he saw someone on the fireman's side draw his head in the cab window. He stated that he did not put any torpedoes on the rails when he went back to protect his train as he had not passed the end of the station platform and the rules did not permit the use of torpedoes at station platforms. He was not certain whether or not the brakes on train No. 13 were applied before the collision occurred.

Conductor Cook of train No. 15 stated that at Tyrone there were a large number of passengers to board his train; when the passengers were all on board he went up to the baggage car, and when the baggage was nearly all loaded he signalled the engineman to call in the flagman who was then at the east end of the station platform. The train had started and had moved about one car length when the collision occurred, at about 2:39 p.m.

Stationmaster Brown of Tyrone station stated that train No. 13 was running at the rate of 30 or 35 miles per hour; he thought it was on track No. 4 until it reached the mail chute at the end of the platform, and he then saw it was on track No. 3. He saw the flagman of train No. 15 return to his train and then saw him run back toward train No. 13 giving stop signals. He stated that it was customary for flagmen to assist passengers off and on trains before going back to flag.

The collision resulted in pulling out one of the couplers on the first car in train No. 15; the rear end of the rear car was crushed for ten or twelve feet and the other end of this car was jammed into the rear end of the dining car, crushing that car for six or eight feet. The engine of train No. 13 was considerably damaged; the tender body was thrown off from the tender frame and came to rest across track No. 4 and at right angles to it. The first postal car was thrown diagonally across track No. 4, the front end striking the passenger station and coming to rest on the station platform; one end of this car was crushed for about fifteen feet and the roof over about half the car was out of alignment. The other end of this car was slightly damaged, and the front end of the second car was stove in. Some of the other cars in this train suffered slight damage, consisting principally of broken windows and fixtures. The substantial construction of the modern steel cars making up these trains is without doubt

the reason that none of the passengers was killed.

A number of officers of the railroad company were riding in the private car on the rear end of train No. 13 making an annual inspection trip. After the accident they examined and tested the semi-automatic home signal at P R tower and automatic block signals 2211 and 2219; on the following day further inspection and tests were made; the signals were found to be in good working condition.

Before train No. 13 left Harrisburg a test of the brakes was made and the brakes appeared to apply and release properly. After the accident all the damaged cars were taken to Altoona, and on August 1st a careful inspection was made of the brakes on all the cars of train No. 13 except one postal storage car which had been sent to Pittsburgh loaded with baggage; the records of the railroad company showed that the brake on this car was in good condition. On one car the brake rigging was damaged to such an extent that a test of the brake could not be made and on another the brake levers had been disconnected before the test was made. The engine also was so badly damaged that no test of the brakes on it could be made, but on the other cars inspection and test indicated that the piston travel was properly adjusted and the brakes were in operative condition.

At the time of the accident Engineman Funk had been on duty about 3-1/2 hours after a period off duty of nearly 34 hours. He was 55 years of age, and had been employed by the Pennsylvania Railroad for about 28 years, 5 years as a fireman, 16 years as a freight engineer and 7 years as a passenger engineer. His record shows that during that time he had been reprimanded for many minor offenses, suspended four times on account of collisions, twice on account of other accidents, and four times for disobeying signals; the last time he was suspended the suspension was for one month, from June 26 to July 26, 1913, "for causing delay to No. 10 by running past E. Alt. Sta. and having to back to the station under flag protection and for previous bad record." As a result of this suspension this was only his eleventh round trip over this road since the automatic signals between "BQ" and "PR" block stations had been placed in service.

Acting Signal Instructor Banks stated his record showed that Engineman Funk had passed with a good percentage an examination on upper quadrant automatic signals on October 28, 1912. Fireman Barton had passed the examination on November 13, 1912, with a fair percentage.

Passenger Trainmaster Moore stated that on passenger trains the rear brakeman is used as a flagman and it is his

duty to assist in unloading and loading passengers; if the train stops an unusual length of time he goes back to protect the train. It is left to the flagman and conductor to determine what is a sufficient length of time to require flag protection. When a train stops at any point other than a station it is the duty of the flagman to go back immediately to protect the train. It is evident, therefore, that Flagman Wallace properly performed the duties required of him. As the train approached Tyrone, the flagman called the station in the dining car and the first coach ahead of it, and then assisted passengers off and on the train at the rear and of the third car from the rear of the train. When he finished this work he went back to protect the train, but had gone only about 500 feet when he was recalled; he did not use torpedoes as the rules did not permit their use near station platforms.

If protection by flag is considered necessary when trains are operated under the automatic block system, the flagman should not be required to perform duties which would prevent him from properly protecting his train. The practice of requiring the flagman to assist in unloading and loading passengers before protecting his train is not conducive to safety and should be discontinued. On this train there were a conductor, a brakeman and a train porter, who should have been able to perform this work in ample time without requiring the assistance of the flagman. Had the rules required the flagman to be stationed at the rear end of the train, and at regular station stops of more than one minute duration to go back with flag and torpedoes to protect the train, in this case the flagman could have gone back to a point east of signal No. 2218; had he done so and placed torpedoes on the rail at that point the collision probably would have been averted.

The minimum running time prescribed for passenger trains between Harrisburg and Altoona, a distance of 131.1 miles, was 2 hours and 20 minutes, permitting an average speed of approximately 58 miles per hour. Train No. 13 ran from Harrisburg to Tyrone, a distance of 116.9 miles, in 2 hours and 10 minutes, or at an average speed of approximately 54 miles per hour. Train No. 15 consumed approximately three hours in making this run, or at an average rate of 39 miles per hour.

Train No. 13 consumed four minutes less than train No. 15 in covering the distance of 4.8 miles between QY tower and PR tower, and the collision occurred approximately two minutes before the schedule time for train No. 13 to pass Tyrone. Regardless of these facts, however, the signals were adequate, had they been obeyed, for the proper spacing of these trains.

This accident was caused by failure of Engineman Funk properly to observe and obey signal indications, and the failure of Fireman Barton and Assistant Road Foreman of Engines Miller properly to observe signal indications.

Ordinarily train No. 13 was run over track No. 3 at Tyrone, but if train No. 13 was likely to be delayed or awaiting a connection at Tyrone, train No. 13 was run on track No. 4. From June 13 to June 26, inclusive, and from July 26 to July 29, inclusive, the periods during which Engineman Funk had been on duty since the automatic signals had been placed in service on this part of the road, train No. 13 ran over track No. 3 on all except one trip, when it ran from PR to RR on track No. 4. This run was made on June 15, and Engineman Funk was not in charge of train No. 13 on that date.

While it is impossible to account for the failure of all three men on the engine of train No. 13 properly to observe the indication of signal No. 2211, and while there can be no excuse for such failure, it is probable that all of them mistook the signal governing track No. 4 for the signal governing track No. 3, which was the signal for their train. Had the employees on this engine been on the alert, they could have seen the indication of signal No. 2219 a considerable distance away, in ample time properly to control the speed of the train and to avert the collision. The reason that the Assistant Road Foreman of Engines was riding on this engine was to see that it was properly operated. To accomplish this purpose he should not have called signals before they were called by the enginemen and fireman but should have assured himself that they were called properly by those men. It is possible that in this case Assistant Road Foreman of Engines Miller saw the clear signal on track No. 4 and called it, and then the fireman and engineman called the signal without properly identifying it.

Had Engineman Funk immediately applied the brakes when Assistant Road Foreman of Engines Miller called the red signal the collision might have been averted. While Miller stated that he saw engineman Funk move the brake valve handle over, he said the brakes seemed to be slow in taking hold. The fireman stated that the engineman made an emergency application of the brakes, but the conductor and brakeman both stated that they noticed no application of the brakes before the collision occurred. A number of eyewitnesses could not say whether or not the brakes were applied. The evidence indicates that the brakes were in good condition, and it is believed that had the brakes been applied in emergency the application would have been noticed by employees on the train and could have been manifest to other employees who were watching the train. When the flagman was seen by

the men on the engine of No. 13 it was no doubt then too late to avert the collision as No. 13 was then probably not more than 600 feet from the rear end of No. 15, but had an effective emergency application of the brakes been made at that time the severity of the collision would have been mitigated.

This accident again calls attention to the necessity for some form of automatic train stopping device. The signals installed at this point were of the most modern type, the signal system was very complete, and there seems to be no question but that the signals operated properly. The engineman of train No. 13 was a man of long experience; the fireman had been in the employ of this company as a fireman for about eleven years and his record was good; and the Assistant Road Foreman of Engines was riding on the engine. Yet all three of these experienced men failed to observe a caution signal indication, the engineman failed to obey a danger signal indication, and the collision resulted.

A consideration of accidents of this character which have occurred within the past two years leads inevitably to the conclusion that even the most complete and modern system of fixed signals is not adequate under all circumstances to insure the safe operation of trains. While it is true that under the automatic block system, such as was in use where this accident occurred, the possibility of the occurrence of errors likely to lead to disaster is greatly reduced as compared with the train order system and the manual block system, even the most modern system of fixed signals does not guard against nor provide any protection against failure of enginemen properly to observe and obey the signal indications.

The following is a tabulation of accidents investigated during the fiscal years 1912 and 1913 wherein enginemen failed to obey fixed signal indications.

Date	Railroad	Location	Kind of Accident	No. of Persons		Cause
				Killed	Injured	
<u>1911</u>						
July 11	New York, New Haven & Hartford	Bridgewater, Conn.	Derailment	14	54	Train crossed over from one track to another at excessive speed; engine-man failed to obey signal and rule.
Sept. 4	Lake Shore Michigan Southern (Penney's) Trains.	Dock Junction, Pa.	Collision, Side.	3	36	Engine crew disregarded signals.
Oct. 19	Pere Marquette.	Detroit, Mich.	Collision, Head-end.	1	44	Contributing cause was failure of engine-man to observe and obey signal protecting switch
Nov. 2	Erie	Haithboro, N. Y.	Collision, Head-end.	1	0	Engineman disregarded block signals and flagman's signal
Dec. 9	Chicago, Milwaukee, & St. Paul.	Corlies, Wis.	Collision, Head-end.	1	3	Contributing cause was failure of engine-man to obey signal indications.

1912

Feb. 17	Pennsylvania Lines West of Pitts- burgh	Larwill, Ind.	Collision, Rear-end	4	11	Failure properly to pro- tect train and failure of engineer to ob- serve and obey signal indications.
Feb. 20	Boston & Maine	North Adams Mass.	Collision Rear-end	4	2	Either false clear sig- nal, or failure to observe signal indi- cation
July 4	Delaware, Lackawanna & Western	Jorning, N.Y.	Collision Rear-end	39	102	Failure of engineer to observe automatic block signal indication and flagman's signal; failure of flagman to use torpedoes.
July 14	Chicago, Burlington & Quincy	Western Springs, Ill.	Collision Rear-end	3	29	Failure of flagman properly to protect train; failure of en- gineer to control speed and to obey sig- nal indications.
Oct. 3	New York, New Haven and Hart- ford	Watport, Conn.	Derailment	7	36	Failure of engineer to observe and obey signals and rules governing operation of trains over a cross-over.

1912

Oct. 18	Delaware, Lancaster & Western	Hollistead, Pa.	Collision; Rear-end	2	0	Failure of flagman improperly to protect train; failure of engineer to observe and obey signal in- dications.
Oct. 27	Lehigh Valley	Hoset's Ferry, Pa.	Collision; Rear-end	1	1	Failure of engineer to observe and obey signal indications; failure of brakeman to call engineer's attention to danger signals; failure of flagman properly to protect train.
1913						
Mar. 14	Union Pacific	Wethenberg, Nebr.	Collision; Rear-end	4	13	Failure of engineer to bring train under control after passing caution signal, and failure to see and obey danger signal.
Mar. 14	Union Pacific	Herdon, Nebr.	Collision; Rear-end	5	2	Failure of engineer to observe and obey signal indications; failure of conductor and flagman properly to protect train.
June 12	New York New Haven & Hartford	Stamford Conn.	Collision, Rear-end	6	26	Failure of engineer to apply brakes in time to stop his train before reaching home signal which was in danger position.

This tabulation includes only those accidents of this character that have been investigated by the Commission during the past two years, and these investigations cover only the most prominent accidents.

In this connection attention is called to the statement contained in the Commission's twenty-sixth annual report, that:

"The problem of the introduction of means to neutralize the effects of human error is one for which no specific solution can be offered. It involves considerations and details pertaining to purely local circumstances and conditions of operation which each railroad must settle for itself. It is probable that in many places the use of some form of an automatic stop device might properly be regarded as necessary to the safe operation of trains."

And in the Commission's report on the wreck at Westport, Conn., it was stated that:

"When a diversion from the lookout for a few seconds on the part of an engineer, caused by perhaps some imperative duty to be performed on the machinery in the inside of his cab, may cause disaster to his train and death to his passengers, there should be no hesitancy in actively taking up the perfection and installation of such supplementary appliances as will bring the train to a stop where danger threatens. . . wreck prevention is the highest duty of railroads. . . To adequately satisfy their obligations to passengers, railroads should avail themselves of the use of some workable automatic train stop. . ."