In re Investigation of an accident which occurred on the Pennsylvania Railroad near Lewistown Junction, Pa., on October 5, 1916.

On October 5, 1916, there was a rear-end collision between a passenger train and a freight train on the Pennsylvania Railroad, near Lewistown Junction, Pa., which resulted in the death of one employee and one caretaker of live stock, and injury to eleven passengers, two employees and nine other persons.

The Middle Division of the Pennsylvania Railroad, on which this accident occurred, extends from Altoona, Pa., to Harrisburg, Pa., a distance of 130 miles. It is four-tracked, with the exception of a three-track section, 6-1/2 miles in length, between Spruce Creek and Tyrone. The movement of trains is governed by an automatic block signal system and by interlocking plants at crossover and junction points. In the vicinity of the point of accident the tracks extend east and west and are numbered from south to north, ordinarily being used as follows: No. 1, eastbound passenger; No. 2, eastbound freight; No. 3, westbound freight; No. 4, westbound passenger.

The last telegraph office passed by the trains involved in this accident was "LF" Block Station, 62.4 miles east of Altoona. Beginning at Granville station, 4 miles east of "LF" Block Station and proceeding eastward, the track is practically tangent for 4,000 feet to automatic signal 1686. The tangent continues for 525 feet east of this signal, at which point there begins a 30-minute curve to the left or north, 375 feet in length. This curve is followed by a tangent 2,175 feet in length, which in turn is followed by a 1-degree 10-minute curve to the north for 1,770 feet, at which point is located signal 1678, the distant signal for "RW" Block Station. The curve continues east of this signal for a distance of 4,200 feet. Signal 1678 is located nearly in the middle of a cut, about 2,000 feet in length and varying in depth from five to thirty feet. This cut, however, does not obstruct the view of the signals. At the point of accident, and for about one mile west thereof, there is a grade approximating .15% ascending eastward.

The automatic block signals involved in this accident are of the upper quadrant, three-position, alternating current electric motor type, electrically lighted, displaying red for stop, green for caution, and white for proceed. Power is furnished from an underground 3,300-volt line laid beside the track. The signals are mounted on bridges over the track, each signal being placed to the right of the track which it governs. The interlocking signals have three arms, the distant or approaching signals two arms, and the automatic signals one arm, with

a marker light. No line wires are used, but the indication of the signal is controlled by a three-position, alternating current, 60-cycle track relay. The installation was begun in 1912 and completed in 1915.

Eastbound freight train W-P 10, en route from Pittsburgh, Pa., to New York, N. Y., in charge of Engineman Ewing and Conductor Eichelberger, left Altoona Yard at 10.15 p.m. It passed "LF" Block Station, on track No. 1, at 12.37 a.m. Signal 1686 was found in the clear position and signal 1678 in the caution position. The speed of the train was immediately reduced to about 10 or 12 miles per hour preparatory to stopping at the next signal. The rear of the train had reached a point about 1,400 feet east of signal 1678 and was running at a speed of 10 or 12 miles per hour when it was struck by train No. 6, at 12.52 a.m. At the time of the accident train W-P 10 consisted of engine 1475, 38 loaded and 3 caboose cars, two of which were deadhead.

Eastbound passenger train No. 6, en route from Chicago to New York, consisting of locomotive 3320, postal cars 7283 and 6583, passenger-baggage 9605, coach 9503 and Pullman sleeping cars Pompton, Morado, Menlo Park and Harmony, all of which were of all-steel construction, except sleeping car Morado, which had a steel underframe and wooden superstructure, was in charge of Engineman Stewart and Conductor Snyder. It left Altoona at 11.20 p.m., 45 minutes late, and passed "LF" Block Station on track 1 at 12.48 a.m., 42 minutes late. It is claimed that signal 1686 was found in the clear position and when signal 1678 came into view it was in the stop position. An emergency application of the brakes was made immediately and the speed of the train had been reduced to about 30 miles per hour when it collided with the rear of train W-P 10. A dense fog prevailed at the time of the accident.

The three caboose cars and two cars of live stock which were on the rear of train W-P 10 were totally destroyed. The locomotive of train No. 6 came to rest on its right side on the south side of the track. The rear of the tender was forced to the north and it came to rest nearly at right angles with the engine, with its rear end blocking track No. 2. The first car in the train, a postal car, was in a partly overturned position, with its east end thrown to the north, lying across tracks 2 and 3 and obstructing track 4. The forward trucks of the next car in the train were derailed. The locomotive on train No. 6 had its front end and intermediate castings broken and the cab was partly destroyed; the trucks of the tender and first postal car were considerably damaged.

Towerman Minnick, in charge of "RW" Block Station located 6.6 miles east of "LF" Block Station, stated that by reason of an eastbound freight train, occupying track 1 in the yard east of his tower, being delayed on account of a hot box, he had been instructed by the train dispatcher to cross

train W-P 10 from track 1 to track 5 at his tower in order to avoid delay to train No. 6, and that the switches and signals were set for this movement when train W-P 10 approached.

Engineman Ewing, of train W-P 10, stated that when his train left Altoona the weather was slightly foggy, but as it proceeded eastward the fog increased in density. He found signal 1686 in the proceed position and signal 1678 in the caution position; he could see both of these signals for 6 or 7 car lengths before the engine reached them. He stated that when his train passed signal 1678 he closed the throttle and made an application of the engine and tender brakes. The train had drifted until the engine was about 15 car lengths from the home signal for "RW" tower, and was running at a speed of 8 or 10 miles per hour when he felt the surge of the train resulting from the collision at the rear. The brakes went on in emergency and his train came to a stop after running about 4 car lengths. Engineman Ewing stated that the rail was wet and slippery, on account of the weather conditions, and he believes that the passage of his train would only serve to make the condition of the rail worse for a following train.

Flagman Silinger, of train W-P 10, stated that passing Granville station he was riding on the rear platform of the caboose in order to watch the signals. As the rear of his train passed signals 1686 and 1678, he saw that they displayed stop indications. He stated that the speed of his train was reduced for signal 1678, that it was running at a speed of 10 or 12 miles per hour and had reached a point some distance east of signal 1678 when suddenly he heard the exhaust of an approaching engine. He turned and looked to the rear, and saw the headlight of an engine about one car length distant. He had time only to shout to the conductor and jump before the collision occurred. He estimates that train No. 6 was running at a speed of 50 miles per hour. Flagman Silinger stated that there were two marker lights, a cupola light and a lantern, displaying red, and one white light on the rear of the caboose, and that these lights were all in good condition. He further stated that he considered that the automatic signals afforded his train some protection, and under the conditions he did not think it necessary to throw off a fusee.

Engineman Stewart, of train No. 6, stated that leaving Altoona the weather was quite foggy, but as the train proceeded eastward the fog became more dense. His train stopped at Tyrone, Huntingdon and Mt. Union, and at each of these places the air brakes operated perfectly. Approaching signal 1686 he was unable to see it until within about one engine length; the signal at that time displayed the proceed indication; he called the indication to his fireman, who was sitting on the fireman's seat and he answered. When the engine got close

to signal 1678, he saw it was in the stop position. He immediately made an emergency application of the brakes, and about the same time he discovered the red lights on the rear of the caboose of train W-P 10; the collision occurred almost immediately. Engineman Stewart stated that approaching the point of accident his train was running at a speed of about 40 miles per hour; the brakes took hold in the proper manner and the speed of the train had been reduced to about 20 miles per hour when the engine struck the rear of the train. He stated that the rail was greasy, but in his opinion he should have been able to stop his train in a distance equal to twice its length, and had he been able to see the signal a hundred yards or so the accident would never have occurred. He furthere stated that the rules require the during fog, trains will run with caution, and if everything is seen to be all right, go ahead. If signals can be seen an engine length away he does not consider it necessary to reduce speed.

The statement of Fireman Blattenberger, of train No. 6, corroborated that of Engineman Stewart. He is positive that he saw signal 1686 displaying proceed indication, and thinks it could be seen a distance of two or three car lengths.

Conductor Snyder, of train No. 6, stated that approaching the point of accident he was riding in the last car of the train. The first intimation of trouble he received was a series of four shocks following in close succession and all within two or three seconds. He estimates that his train ran about four car lengths after the first shock occurred.

Trainman Hibsman, of train No. 6, stated that approaching the point of accident he was riding in the rear of the smoking car, the third car from the engine. The train was running at a speed of 55 or 60 miles per hour, when suddenly he felt an emergency application of the brakes; the crash came a fraction of a second later, and the train stopped almost immediately.

Engineman Kugler, of eastbound extra 1312, which departed from "LF" Block Station on track 2 at 12.31 a.m., stated that as his train approached signal 1686, he observed that it displayed a clear indication for track 2, and a caution indication for track 1. He could see the signal lights 6 or 8 car lengths distant. When his engine was about 8 or 10 car lengths beyond signal 1686, his train was passed by train No. 6, on track 1, running at a speed of 40 or 45 miles per hour. At that time he remarked to his fireman: "The stock train must be giving No. 6 the signals very promptly." He stated that when signal 1678 first came into view, it was in the caution position, but suddenly changed to stop; about the same time he saw a flagman running back toward his train. He made an application of the

brakes and brought his train to a stop, about 3-1/2 car lengths beyond the signal. Engineman Kugler further stated that about 20 minutes after his train came to a stop, in an effort to ascertain how far signal 1678 could be seen in the fog, he walked back along his train and found that the signal indication could be seen for a distance of 12 car lengths. The statement of Engineman Kugler, relative to the position of signal 1686 governing track 1, is supported by that of his fireman.

Engineman Kauffman, of train second No. 14, which passed "LF" Block Station on track 1 at 12.53 a.m., five minutes behind train No. 6, stated that he found signal 1686 in the caution position; approaching signal 1678 he was able to see it 8 or 9 car lengths distant, it being in the stop position. The flagman of train No. 6 came into view about the same time he saw the signal indication. Engineman Kauffman stated that, under the practice on the Pennsylvania Railroad, during foggy weather dependence is placed upon the engineman as to whether or not he can see the signal indications clearly, and to regulate the speed of his train accordingly. In his opinion the fog on the night of the accident was not dense enough to require trains to reduce speed to be sure of signal indications. Engineman Kauffman stated further that he found the rail in a wet and slippery condition.

General Road Foreman of Engines Alexander stated that a train having the air brake equipment that train No. 6 had, and running at a speed of 50 miles per hour, should under favorable conditions, be able to stop in about 1,100 feet.

Signal Maintainer Youngkin stated that he reached the point of accident about 3.00 a.m., and while there, in company with the signal foreman, examined every piece of apparatus in connection with the signal, and tested the relay, but was unable to find anything wrong. No changes, repairs, or adjustments were made to signal 1686 after the accident. He also stated that there is no record of a failure of this particular signal since its installation.

Superintendent Smith stated that under the rules in effect on this division it was proper for train W-P 10 to occupy track 1 on the time of train No. 6. He stated that, in practice, they must admit that they allow flagmen to depend to a certain extent upon automatic signals for protection, but dependence upon a signal would not excuse a flagman. In his opinion, in view of the practice prevailing on this division, the flagman of W-P 10 was justified in not throwing off a fusee. Superintendent Smith stated further that passenger trains frequently make up time in foggy weather. The company requires that if the fog is so thick that an engineman cannot see signals, he must run accordingly and stop to find the pole if necessary.

In order to determine whether or not Engineman Stewart may have seen the white light between the signal lens and the roundel when the signal was in the caution position, and thus have been misled by taking it for a clear signal, several tests were made with a locomotive and signals of a type similar to those involved in this accident, and under perfect conditions with the locomotive running at a speed as low as 30 miles per hour, it was found that it was practically impossible to receive a false indication in such a manner.

The records of the Pennsylvania Railroad show that on this division there are 559 alternating current signal mechanisms; that since April 7, 1914, there have been approximately 20,437,000 signal operations and, during that period, but six false clear failures, or one false clear failure for each 3,406,000 operations. With the exception of one failure caused by lightning, all of these failures were caused by mechanical defects, and in all of these instances the failure was of such a nature that the signals continued to display an improper indication until the defects had been remedied.

A careful examination and tests of the signals and apparatus connected therewith, by the Commission's signal engineer, failed to disclose any defect or condition which would be likely to lead up to a false clear indication.

The investigation discloses that the automatic signals involved in this accident were working properly about a minute before the accident, five minutes afterward, and have since continued to operate properly without repairs, changes, or adjustments. Therefore, unless some abnormal condition arose a few moments before the passage of train No. 6 and disappeared immediately afterward, leaving no trace, which is highly improbable, there was nothing which could have caused the signal to display an improper indication for train No. 6.

The conclusion is therefore reached that Engineman Stewart and Fireman Blattenberger were mistaken in regard to the indication displayed by signal 1686, due either to their failure to see the signal, or, on account of the fog and speed of the train, to read its indication correctly.

The point at which the collision occurred was approximately 1,400 feet east of signal 1678, which was admitted by Engineman Stewart to have been in the stop position. His failure to stop his train within this distance is inexplainable except on the theory that, approaching signal 1678, he expected to find the indication displayed no more restrictive than caution, and when suddenly confronted with a stop indication, he did not interpret it promptly and, as a consequence, the application of

the brakes was somewhat delayed.

The record of this case discloses that at the time of accident a dense fog prevailed, which prevented signals from being seen at any great distance. The train was running at its usual schedule speed for clear weather and the engineman failed correctly to observe the indication of a signal upon which the safety of a preceding as well as his own train depended. That a dense fog seriously interferes with the proper observation of signals by an engineman of a train which is running at a high rate of speed, is a self-evident fact, and the practice of permitting fast trains to run at high speed during the existence of such conditions proves a grave menace to the safety of the traveling public.

This accident again brings forcibly to attention the necessity for the enactment and rigid enforcement of rules or regulations requiring that under such conditions the speed of fast trains be reduced to such an extent as will enable the engineman to read and interpret correctly signal indications with absolute certainty. Until such rules are promulgated and enforced, accidents such as this may be expected to occur.

Engineman Stewart entered the service as fireman December, 1885, was promoted to engineman in March, 1890, and to passenger engineman in December, 1909. Fireman Blattenberger entered the service as freight fireman in December, 1903, and was promoted to passenger fireman in January, 1911. Both of these men are considered reliable and competent employees. An examination of the service record of Engineman Stewart discloses that, since June 5, 1912, he has been commended on ten different occasions for having made schedule time or better with passenger trains on every day of a month. At the time of the accident they had been on duty 3 hours and 31 minutes, after having been off duty nearly 36 hours.