

**In re investigation of an accident which occurred on
the Pennsylvania Railroad at Pittsburgh, Pa.,
August 19, 1917.**

Sept. 18, 1917.

On August 19, 1917, there was a side collision on the Pennsylvania Railroad at "R" Tower, about .6 miles west of East Pittsburgh, Pa., between two east bound freight trains, which resulted in the death of 3 employees and injury to 1 employee. After investigation of this accident, the Chief of the Division of Safety reports as follows:

The part of the Pittsburgh Division of the Pennsylvania Railroad on which this accident occurred is a four track line, the tracks being numbered from south to north. West of "R" Tower, No. 1 and No. 2 tracks are eastbound passenger and eastbound freight respectively, and No. 3 and No. 4, westbound freight and westbound passenger tracks. At "R" Tower the arrangement of tracks is changed and east of there No. 1 and No. 3 are eastbound freight and eastbound passenger and No. 2 and No. 4 are westbound freight and westbound passenger respectively. The movement of trains is governed by timetable and automatic block signal system. Trains are moved with the current of traffic upon signal indications.

"R" Tower controls the switches and signals required to accomplish the change of traffic between main tracks and also controls the connection to the Monongahela Division, known as the "U" track, which leads off from the south of track No. 1. The apparatus at "R" Tower is of the electro-pneumatic type, originally installed in 1905, but it has been added to and revised since that date. The eastbound home signals for tracks 1 and 2 are on a bridge about 600 feet west of the tower, and, as these two tracks converge, all the arms for these tracks are controlled by one lever in the interlocking machine. The selection of the proper circuit to control any of the signal arms is made by contacts connected with the machine levers. A special locking or indication circuit is used, passing through circuit closers on all signal arms, including the distant arm, controlled by the home signal lever and through lock coils on the interlocking machine, so that if any of the signals do not assume the stop position when the lever is put normal the stroke of the lever can not be completed. All three arms on the signal for track 1 are operative, but only the two lower ones for track 2. The lowest arm is not slotted or controlled by track circuits, but the high and medium speed arms are so controlled. The distant signals are of the same type, with home and distant arms on the same mast and are on a bridge just west of Bessemer station, 3184 feet from the home signals. There are two distant arms for track 1, controlled by the high and medium speed arms of the home signal; as only the medium speed

arm is operative on the home-signal for track 2, only one distant arm is used. In addition to being controlled by the corresponding home arms, each distant arm is also controlled by the track relays and by the automatic signals east of "R" Tower. The wires from the tower to the home signal bridge are laid in pitch in wood trunking and placed underground; the wires between the home and distant signals are on a pole line. All indications are given in the lower right hand quadrant, the signals being two position; the colors at night are: green, yellow and red for clear, caution and stop, respectively.

Track circuits are used in place of detector bars and section locking is installed so that the switch levers are held in position while a train is on the track section in which the switches they control are located. Approach locking is provided, effective from the second block in the rear or approximately 7,800 feet from the home signal. After a train enters on this section a route is locked up and can not be released until the train passes, except by use of the time release, which requires two minutes to operate. An annunciator is provided in the form of a light, which tells the operator when a train is approaching. The length of the blocks on track 1, between "WX" Tower east and Wilkinsburg yard, and the distant signal for "R" Tower, on Signal bridge 3422, are: 3379, 3508, 2922 and 4747 feet respectively.

Approaching "R" Tower from the west there is a tangent 2500 feet long, leading to a 5° curve to the right 540 feet long. Then there is a short piece of tangent 250 feet in length, followed by a 6° curve to the left 800 feet long. After another section of tangent about 250 feet long there is a $2^{\circ} 15'$ curve 1000 feet long to the right, followed by a tangent 500 feet in length, on which "R" Tower is located. The eastbound home signal for "R" Tower is about 500 feet east of the west end of the $2^{\circ} 15'$ curve. From the end of the 1st curve west of it to the distant signal is a distance of 1500 feet and the view is unobstructed. Owing to the curves between the distant and home signals and a bluff on the inside of the 6° curve, an enginemen's view, approaching the home signal on track 1, is limited to about 675 feet. Any one riding on the fireman's side would have a longer view, but it might be reduced by a train on track 2.

The grade approaching "R" Tower from the west is descending, varying from .37 to 1.37 per cent, but averages approximately .8 per cent for about 2 miles. At the point of accident the grade is .92 per cent descending.

The trains involved in this accident were Extra 2172 and Extra 2318. Extra 2172 consisted of an engine, 45 freight cars and a caboose in charge of Conductor Davenport and Enginemen Mickey and was en route from Coleman Yard, Pittsburgh, Pa., to Shire Oaks, Pa., on the Monongahela Division. It left Coleman Yard at 12:17 a. m., August 19th and arrived at "P" Tower at 3:00 a. m., where helper engine 1993, in charge of Engineman Weaver, was coupled in ahead of engine 2172 to assist the train from track 2 around onto the Monongahela Division. A short time after helper engine 1993 was coupled in ahead, this train received a proceed indication on the lower arm of the signal governing No. 2 track, started through the interlocking plant and had the second car back of the engine struck by Extra 2318 at about 3:30 a. m. The weather at the time was foggy or smoky.

Extra 2318, known as PG 30, consisted of 17 cars of manifest freight and a caboose, en route from Wilkinsburg Yard, Pa., to Conemaugh, Pa., on the Conemaugh Division, in charge of Conductor McGraw and Engineman Lichenfels. It left "WA" Tower, the east end of Wilkinsburg Yard, at 3:20 a. m. on No. 1 track, passed the home signals at "P" Tower in the stop position and struck Extra 2172 about 175 feet east of the home signal at about 3:30 a. m., as that train was crossing from No. 2 track to the Monongahela Division. The speed of this train is estimated by members of the train crew and the engineman of a light engine that followed to have been from 18 to 20 miles an hour.

After the accident, engine 2318 and tender came to rest on their right sides on a parallel switching track south of No. 1 track. Both engine and tender cleared No. 1 track about 2 feet for their entire length, the head end of the engine being about 130 feet east of the point where the trains first fouled. The head car of this train, with the front truck torn off, came to rest with the front end on the rear end of the tender in an upright position and with the rear end off the track but over No. 1 track; the next two cars were derailed directly back of it, but nearly in line with No. 1 track. The rear end of the first and head end of the second car of Extra 2172 were shoved out to the north in a "V" shape, blocking No. 1 track, while their opposite ends were near the north side of No. 2 track. Both of these cars remained in an upright position. About 150 feet of track and 150 feet of the signal wiring was torn up.

The engineman, conductor and head brakeman, who were riding on engine 2318, were killed in the accident.

Fireman Treter, of engine 2318, states that while he had been firing since Jan., 1916, this was his second trip over the division west of Pitsburgh and he was not familiar with the road or signals there. He also stated that they ran light from Pitsburgh to

Wilkinsburg, and that when on the way in from Pitsairn, Engineman Lichenfels said he had not been over this territory for 10 years. He told the engineman that he should have a pilot, but Engineman Lichenfels replied that, if he asked for one, they would hardly give him a pilot, but would expect the conductor to pilot him. After the train was made up at Wilkinsburg, a test of the brakes was made and they were told all were working on the 17 cars of the train except two. They were stopped by a signal at "WK" Tower, and after starting again ran on No. 1 track to the point of accident. The conductor was on the fireman's seat, apparently looking out of the window for signals, and the brakeman was standing in the gangway between the engine and tender, on the right hand side. He was busy with his fire, which was giving some trouble, and looked out at times for signals, but saw none. He heard no one call signals from the time they left "WK" Tower. When not firing, he was sitting on the left side in the gangway between the engine and the tender and was there just before the accident. Just an instant before the collision, he saw the brakeman jump out between the engine and tender and the conductor ran over to the right side, attempting to get off. The engineman applied the brakes in the emergency and followed the conductor but had only gotten between the engine and tender when the accident occurred. At no time did he think the speed exceeded 20 miles per hour and the automatic brake was not applied, but the engineman used his straight air several times.

Flagman Morrow, of Extra 2318, stated that before leaving the yard a road test of the air brakes was made and the brakes worked properly. A stop was made between the yard and "WK" Tower, at which time the brakes worked properly. The collision occurred 10 or 12 seconds after an emergency application of the brakes and the train did not move over a car length after that. After the collision he said he went back about 25 car lengths, but not far enough to see the signals on bridge 3422, near Bessemer station. A light engine following them came to a stop at bridge 3422, and after the engine left this bridge, he flagged it. He estimated their speed just previous to the accident as 20 miles per hour.

Brakeman May, on Extra 2318, stated that this was his third trip since being employed and that he was not familiar with the tracks around "R" Tower. He coupled up the air hose at Wilkinsburg, but did not assist in the air test, nor did he know how many brakes were out. While one stop was made after leaving the yard, he did not notice how the brakes worked in the caboose, where he was riding.

Engineman Mickey, of engine 2172, said they arrived at "R" Tower on No. 2 track about 2:55 a. m., and the helper engine, #1993, coupled on at 3:20 a. m. He got a "yellow" or caution signal to pull out of No. 2 track and noticed that all signals on No. 1 track were red. He did not know of extra 2318 approaching until it struck his train. Its headlight was burning with an ordinarily good light.

Flagman Hare, of Extra 2172, said he dropped off west of the distant signal for "R" Tower and the train stopped about 8 car lengths east of the bridge, afterwards pulling farther down, but remaining 40 or 50 minutes before starting to pull around the "U" track. When he first dropped off, the signals on bridge 3422, on track No. 1 were red and yellow, but he did not observe them again.

Engineman Weaver, of helper engine 1893, stated that he coupled on extra 2172 for the purpose of assisting that train around the "U". The lower signal arm for track No. 2 cleared for their train shortly after, displaying a yellow light. He said that as his train started to make the crossover movement he noticed the signals on track 1 and they were all in the stop position. He stated he noticed no other movements through the interlocking after ~~he~~ he coupled onto extra 2172 until they started out, about a minute after he went into track 2.

Fireman MacCortney, of helper engine 1993, said the signals on track No. 1 were all red after they coupled onto extra 2172.

Operator Miller, of "R" Tower, stated that Extra 2172 passed "WK" Tower, east of Wilkinsburg, at 1:07 a. m., and arrived at his tower on track 2 at 1:00 a. m. Extra 2318, PG 30, passed "WK" at 3:20 a. m., arriving at "R" Tower, and colliding with Extra 2172 at 3:30 a. m. Extra 2172 was held on track No. 2 for a helper to assist it around the "U" track to the Monongahela Division. After the helper was coupled in ahead of 2172, the train was held for extra 604 to cross from track 1 to track 3, and this train cleared "R" Tower at 3:25 a. m. The signal was given extra 2172 to come off track No. 2 at 3:26 a. m., and, after it started, the indicator showed the approach of extra 2318. Operator Miller says the switches were not changed after they had been lined up for extra 2172 to go off No. 2 track. He could not see the eastbound signals on the bridge, but his indications were properly received and he has never had any trouble with this apparatus in the 6 months he has worked there.

Engineman Brotherton, of helper engine 897, stated that he followed extra 2318 closely from "WK" Tower on track No. 1, and received a stop signal at Swissvale, but the other signals up to the distant for "R" Tower cleared as he reached them. He stopped for the signals on bridge 3422, carrying the distant for "R" Tower, proceeded and was flagged. His speed did not exceed 15 or 20 miles per hour.

Assistant Signal Supervisor Fisher said he had made

no tests of the insulation since the plant was rewired three years ago, that no record existed of any false clear indications of the signals concerned in the accident and that no foreign current had been observed in this vicinity. A false clear signal had been found in May, 1916, just east of Swissvale, due to a defective joint and foreign current, and another at Wilkinsburg, in January, 1917, due to ice and snow freezing about the semaphore shaft. He stated the relay cases were sealed about 5 a.m. after the accident and remained so until Tuesday afternoon, being constantly watched during that time. He made no change in the apparatus before sealing it up, but saw it was in proper condition and that the signals were giving the proper indication for the conditions existing.

This accident was caused by the failure of the engineman and conductor of Extra 2318 to observe and comply with the signal indications.

Tests were made on signals involved in the accident, their mechanisms examined and their operation observed. The machine locking was tested and found correct. In testing the indication circuits, however, it was found that an indication was received at the interlocking machine when the lowest arms on eastbound home signals on both Nos. 1 and 2 tracks were in about the 45 degree position, caused by improper adjustment of the circuit closers on the signals. This failure to indicate properly, however, did not have any bearing on the accident, as the last movement east ward before the accident required the use of the upper arm for track 1. Had the lower arm remained clear, it would not have resulted in a false clear distant signal, since it does not in any way control the distant signal. The control circuits from the terminal board in the tower to the signal bridge and from the bridge to the distant signal were tested and found free of crosses or grounds. A section of the conduit that was damaged by the accident was examined and the wires found to be in good shape, with perfect insulation. The plant was completely rewired about three years ago and all control wires were run from the tower terminals to the units operated without a break or splice. The time release for track 2 was tested and found to operate after the proper interval of two minutes. Since battery to control the distant signal comes from the tower through circuit closers open in the normal position, attached to the home signals which, from the testimony, were in the stop position at the time of the accident, foreign current in the track circuit between the home and distant signals could not have resulted in a false clear distant signal.

It is believed that the results of the investigation and of the tests made are sufficient to support the conclusion

that both Engineman Lichenfels and Conductor McGraw, who was riding in the locomotive, failed to observe and obey the indications of the distant signal on bridge 3422 and the home signals on bridge 3416, governing the movement of their train.

Nothing was disclosed by the investigation and test to indicate that these signals were not working properly at the time of the accident and there is the further evidence of several members of the crews of trains on track 2 that the home signal indicated stop only two or three minutes before the accident and in that brief time there was nothing apparent that could have changed the indication of that signal. The distant signal was working properly a short time before the accident and gave the proper indication to the helper engine immediately following extra 2418. After the accident the signals were watched for several hours and in each instance worked properly.

Conductor McGraw was 45 years old and entered the service as a switchman in August, 1901, and was promoted to conductor in November, 1916. Engineman Lichenfels entered the service in November, 1901, and was promoted to engineman in January, 1910. Brakeman Miller was 27 years old and had entered the service in December, 1909. At the time of the accident the crew had been on duty about four hours.

G. E. E.