INTERSTATE COMMERCE COMMISSION

REPORT OF THE CHIEF OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE PENNSYLVANIA RAILROAD NEAR GOULD, OHIO, ON SEPTEMBER 25, 1921

OCTOBER 19, 1921

TO THE COMMISSION

On September 25, 1921, there was a rear-end collision between a mail train and a freight train on the Pennsylvania Railroad near Gould, Ohio, which resulted in the death of 2 employees, and the injury of 6 mail clerks and 3 employees This accident was investigated in conjunction with representatives of the Public Utilities Commission of the State of Ohio

LOCATION AND METHOD OF OPERATION

This accident occurred on that part of the Panhandle Division which extends between Pittsburgh, Pa , and Newark, Ohio, a distance of 157 8 miles, in the vicinity of the point of accident it is a double-track line over which trains are operated by time-table, train orders, and an automatic block-signal system Beginning at a point about 2,640 feet west of the station at Gould and extending westward there is a tunnel 3,320 feet in length known as No 5 or Gould Tunnel, the accident occurred in about the center of this tunnel Train movements through the tunnel are controlled by the operation at NA Cabin, located about 1,350 feet west of the western portal, an absolute block being maintained through the tunnel Under special instructions freight trains in opposite directions are permitted to occupy the tunnel at the same time, but passenger trains are not permitted to enter the tunnel when occupied by another train except by special instruction The westbound signals east of the tunnel are automatic signals on bridges 47 5 and 48 4, and semiautomatic signal 13, these signals are located 10,516, 6,416, and 2,275 feet, respectively, from the eastern portal of the tunnel The caution or 45-degree indication of signal 13 is controlled by the track relays of the section in which the tunnel is located and by lever 13 at NA Cabin, when the caution indication is displayed it authorizes a train to proceed, prepared to stop at signal 16 located near NA Cabin, west of the tunnel In-

vestigation disclosed that at the time of the accident the ventilating fan was not in operation, due to power being off while linemen were working on the power line, and that there was considerable smoke in the tunnel Illustration No 1 shows the eastern portal of the tunnel, while illustration No 2 shows signal 13

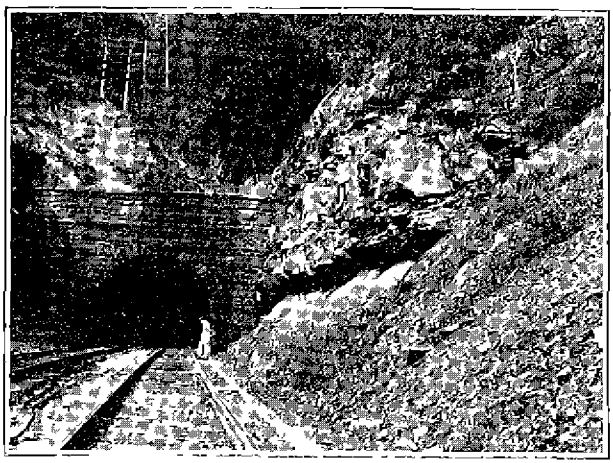

FIG 1.—Eastern entrance to No 5 of Gould Tunnel

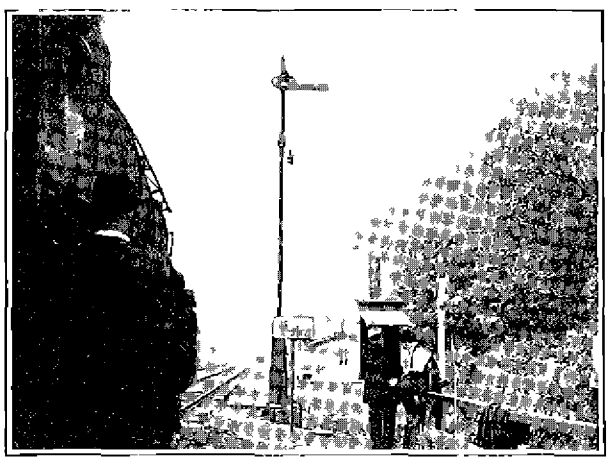

FIG 2.—Semiautomatic signal 13 governing block section extending, through the tunnel, to signal 16 at NA Cabin

Approaching the point of accident from the east, beginning at Gould, the track is tangent for about 1,650 feet, followed by a 1-degree curve to the right, 825 feet in length, and about 1,735 feet of tangent to the point of accident, the grade at this point is 0 77 per cent ascending for westbound trains The weather was cloudy at the time of the accident, which occurred at about 11 09 a m

DESCRIPTION

Westbound freight train extra 7468, consisting of 32 cars and a caboose, hauled by engine 7468, was in charge of Conductor Schupp and Engineman Otto It passed SX Block Station, the last open telegraph office, 2 3 miles east of Gould, at 11 01 a m, and while moving at an estimated speed of 7 miles an hour in the tunnel was struck by train No 11

Westbound mail train No 11, consisting of 7 mail cars and 1 combination car, of all-steel construction, hauled by engines 7288 and 8122, was in charge of Conductor Griffin and Enginemen Birch and Hunnighouse This train passed SX Block Station at 11 07 a m, 6 minutes late, and collided with the rear end of extra 7468 while traveling at a speed of about 30 miles an hour

The caboose and the seven rear cars of the freight train were derailed and practically demolished Engines 7288 and 8122 were derailed, but remained practically upright, with engine 7288 across the tracks The first car of train No 11 was derailed, and its front end was damaged The employees killed were the conductor of the freight train and the engineman of the leading engine of the mail train

SUMMARY OF EVIDENCE

The statements of Engineman Otto, Fireman Baughman, and Head Brakeman Carter, of extra 7468, all of whom were on the engine, were to the effect that signal 13 was displaying a caution indication when passed by their train, that the speed of the train when entering the tunnel was from 25 to 30 miles an hour, and that on account of the engine slipping this speed had been decreased to about 5 to 8 miles an hour at the time of the accident Their statements also indicated that just after entering the tunnel a train passed on the eastbound track, and that as the fan used for ventilating the tunnel was not in operation the tunnel was very smoky

Flagman Whitmire, of extra 7468, said signal 13 was displaying a caution indication as the train approached it, and that after passing it the indication changed to stop His estimates as to the speed of the train when entering the tunnel and at the time of the accident practically agreed with those of the engine crew Flagman Whitmire said that at the time of the accident he was in the cupola of the caboose, with the conductor, he had not thrown off any fusees or put down any torpedoes, saying he was depending upon the block signals for protection He also said that the caboose marker lights were not burning

Fireman Winterbottom, of the leading engine of train No 11, and Engineman Hunnighouse and Fireman Markley, in charge of the second engine, said signal 13 was displaying a caution indication

when passed by their train, they estimated the speed of the mail train at the time of entering the tunnel at 25 or 30 miles an hour, and Engineman Humrighouse thought this was about the speed at the time of the accident Fireman Winterbottom said he did not observe any lights or signals in the tunnel, and that the smoke was so dense he did not think it would have been possible to see them had they been displayed Engineman Humrighouse also stated that when he went out of the tunnel after the accident, signal 13 was then displaying a caution indication He saw an engine approach to pull back the undamaged portion of train No 11, and he said that when this engine passed the signal it went to stop position and then changed to caution Conductor Griffin, of train No 11, said signal 13 was displaying a caution indication when he came out of the tunnel after the accident, about 8 or 10 minutes after the train had passed the signal Flagman Birney said the indication was caution as the train approached and that it was displaying a stop indication after the train had passed, on going back to flag after the accident he found it to be displaying a caution indication

NA Cabin is equipped with a 16-lever Saxby & Farmer machine, having 15 working levers and 1 spare space There are 7 electric locks, 2 time releases, 5 track indicators, and 2 signal repeaters The accompanying diagram shows the westbound signals between Mingo Junction and a point west of NA Cabin, together with the circuits involved in this accident There are also shown, indicated by arrows, the circuits found by the signal department of the railroad to exist, as a result of various grounds, when they examined and tested the signal apparatus shortly after the occurrence of the accident, prior to the arrival of the Commission's inspectors

One of the signal repeaters at NA Cabin is designated as 13–M, it is held in its normal or horizontal position by current from battery B–5, flowing through the circuit breaker contacts on westbound signal 48 4 which are closed while this signal is at stop or caution, or between those positions, thence through the circuit breaker contacts on signal 13 which are closed while this signal is in stop position, thence to the coils of this repeater and to common wire C–1, thus energizing the instrument When this circuit is open, the repeater assumes the clear position by gravity, thereby indicating that signal 13 is not in stop position

Track indicator 1–A, also located in NA Cabin, is intended to indicate whether the westbound track is occupied between signal 13 and the western portal of the tunnel This indicator is operated on a stick circuit, as follows Current from battery B–3 flows through the front contacts of track relay A–1 at signal 13, front contacts of track relay B–1 at eastern portal of tunnel, contacts of circuit breaker on lever 13 at NA Cabin when this lever is normal, and through the

coils of the indicator to common wire C–1, thus completing the pick-up circuit, the holding circuit is through a front contact in the usual manner, and lever 13 can then be reversed without affecting the position of the indicator When this indicator has been energized as described, it indicates that the westbound track is clear between signal 13 and the western portal of the tunnel, it is restored to normal position when either track relay A–1 or track relay B–1 is deenergized

The intended circuit for the caution indication of signal 13 is as follows Track relays A–1, B–1, and C–1 for the three track-circuit sections in this block are energized by their respective batteries, relay 13–H controls the movement of signal 13 from stop to caution, and is energized as follows Current from battery B–2 flows through the front contacts of track indicator 1–A, contacts of circuit breaker on lever 13 at NA Cabin which are closed when this lever is reversed, front contacts of track relay C–1, through the coils of relay 13–H, front contacts of track relay C–1, contacts of the circuit breaker on lever 13 which are closed when this lever is reversed, and thence to common wire C–2 When this relay has been energized, the motor circuit is completed and the semaphore is moved from stop to caution position Signal 13 can be cleared when the track between signal 13 and the first automatic signal west of NA Cabin is unoccupied

On the day of this accident, westbound train No 1219 passed SX Block Station at 10 54 a m While it was passing through the tunnel, Operator Wiles, on duty at NA Cabin, noticed that signal repeater 13–M had gone from horizontal to clear position, indicating that signal 13 was not in the stop position, track indicator 1–A, however, was in horizontal position, indicating that the track was occupied between signal 13 and the western portal of the tunnel With signal 13 displaying the proper indication, signal repeater 13–M should have remained in horizontal position, and, as on a previous occasion Operator Wiles had noticed that it assumed the clear position when apparently it should have been in the stop position, he supposed that it was out of order and sent for a repairman, who arrived at about 11 a m Extra 7468 passed SX Block Station at 11 01 a m , and the route was lined up for the movement of the train On the approach of the train, the signal repeater went from the clear to the horizontal position, which is the intended operation of this repeater as a train passes signal 13, and it was assumed that the apparatus was in normal working condition, but after remaining in the horizontal position about 5 minutes, the repeater again assumed the clear position with the indicator in the horizontal position, under the conditions as they then existed, therefore, the repeater showed that signal 13 was not in the stop position,

although extra 7468 was in the tunnel At the time, Operator Wiles thought the trouble was with the repeater instead of the signal Operator Wiles said that if the route is clear, it is his custom to clear the signals as soon as a train is reported by at SX Block Station, and that lever 13 is left in reverse position until the train has passed signal 16, the westbound home signal at NA Cabin, when the difficulty developed just before the occurrence of the accident it did not occur to him to restore the lever to its normal position and thus hold the signal in the stop position Operator Wiles also said that similar trouble with repeater 13–M had been experienced on several previous occasions since he started work at NA Cabin in January

Signal 13 was installed 8 or 9 years ago and was overhauled 2 or 3 years ago, when the signals were changed to upper quadrant Weekly inspections by the maintenance force are made of the entire interlocking plant at NA Cabin, and additional inspections and tests are made monthly by an instrument inspector of relays, indicators, repeaters, electric locks, and signal mechanisms Within the 2 weeks prior to the date of this accident the wiring at NA Cabin had been tested for resistance, at which time no trouble was found

According to tests made by the signal department of the railroad on the afternoon of the accident, the positive side of battery B was grounded on an operating arm of a circuit breaker on westbound signal 46 1, east of Mingo Junction, while wire 2–K–1 was grounded on the frame of the interlocking machine at SX Block Station, at a point where it passes through a hole in the supporting casting for electric lock 2–K, wire 2–K–1 is an extension of the positive battery wire which was grounded on the circuit breaker at signal 46 1 Therefore, when signal 46 1 was displaying a stop or caution indication, this wire was grounded, and with signals 1 and 2 in normal or stop position and lever 7 at SX Block Station normal, the wire was grounded in two places in multiple

It was also found that at the western portal of the tunnel, control wire 13–H–2 for relay 13–H at signal 13 was grounded between the relay box containing track relay C–1 and the pole line The wiring between this relay and the pole line was contained in an iron pipe, extending from the base of an iron post supporting the relay box to a point just beneath the lower cross arm of the pole carrying the signal line circuits, wire 13–H–2 being one of a pair incased in lead sheathing

It was also found that the negative side of battery B–2, which is connected to common wire C–2, was grounded to the mechanism case of eastbound signal 2 at NA Cabin, and there was an intermittent ground on common wire C–1 at some point not located

The result of these grounds was that under certain conditions the relay controlling the caution position of signal 13 was energized while the westbound track was occupied between signals 13 and 16 by means of the following circuit From positive side of battery B, through the circuit breaker of westbound signal 46 1 when this signal was at stop or caution, to ground through broken-down insulation on wire 1–K–1, also through another path to ground, when signals 1 and 2, and lever 7, at SX Block Station, were normal, as has already been described, thence to wire 13–H–2 where grounded on iron pipe at or near track relay C–1, through front contacts of track relay C–1, wire 13–H–3, coils of relay 13–H, wire 13–H–4, front contacts of track relay C–1, wire 13–H–5, contacts of circuit breaker on lever 13 at NA Cabin which are closed when lever is reversed, common wire C–2, to ground on the mechanism case of signal 2 at NA Cabin, ground on common wire C–1, and thence back to the negative side of battery B at signal 46 1 This circuit energized relay 13–H and caused the display of a false caution indication by signal 13

Assistant Supervisor of Signals Ishler said there was a severe electrical storm at about 2 a m on the date of the accident, and that it was possible the grounds on wire 13–H–2 and on signal 2 at NA Cabin were due to lightning the only protection against lightning provided in these circuits being pin-point arresters across the relay coils

Extra 7468 was being operated on the time of train No 11 under authority of special instructions in the time-table which read in part as follows

"* * * trains will run with the current of traffic by automatic signals whose indications will supersede time-table superiority, but a train having work to do between two passing stations must conform to rule 86 between such stations * * *"

CONCLUSIONS

This accident was caused by signal 13 displaying a caution instead of a stop indication when the block which it governed was occupied

This signal failure was the result of defective wiring Tests conducted by the railroad company subsequent to the accident disclosed grounds on the wiring in five different locations If these grounds existed for any considerable period of time prior to the accident, they should have been discovered by careful inspection and tests, and corrected

Interlocking signal rule 615 provides that "signals must be restored so as to display the normal indication as soon as the train

or engine for which they were cleared has passed the signal" Operator Wiles, on duty at NA Cabin, did not comply with this rule He stated it was not his practice to restore the lever controlling signal 13 to normal until the train passed signal 16, and after reversing this lever for extra 7468 he left it in reverse position In this particular instance the conditions were such that had Operator Wiles returned the lever to normal position as required by rule, signal 13 would have remained in the stop position until again cleared by him, and the accident would no doubt have been averted

Rule 99 is modified by special instruction No 19, contained in the time-table, which reads in part as follows

"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

"When day signals can not be plainly seen, owing to weather or other conditions, night signals must also be used

"Conductors and enginemen are responsible for the protection of their trains"

Had Conductor Schupp or Flagman Whitmire, of extra 7468, thrown off a lighted fusee when the speed of their train was reduced in the tunnel, it is believed that it would have provided a material safeguard

The employees involved were experienced men, and at the time of the accident none of them had been on duty in violation of any of the provisions of the hours-of-service law

Respectfully submitted

W P Borland,
Chief, Bureau of Safety

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