INTERSTATE COMMERCE COMMISSION

REPORT OF THE CHIEF OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE MISSOURI PACIFIC RAILROAD AT SULPHUR SPRINGS, MO., ON AUGUST 5, 1922

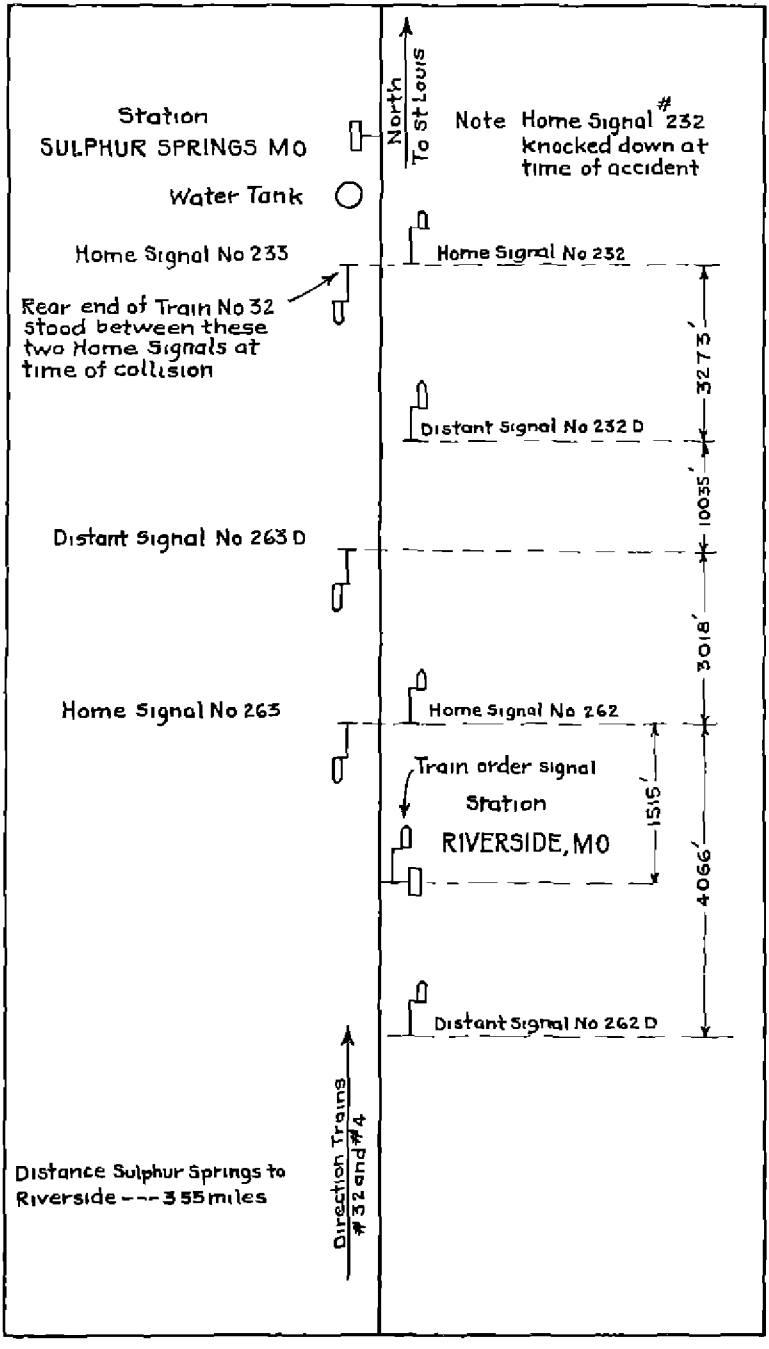
OCTOBER 10, 1922

To the COMMISSION

On August 5, 1922, there was a rear-end collision between two passenger trains on the Missouri Pacific Railroad at Sulphur Springs, Mo., resulting in the death of 32 passengers, 1 employee, and 1 trespasser, and the injury of 171 passengers, 10 employees, 1 mail clerk, 2 news agents, 1 express messenger, and 1 Pullman porter

LOCATION AND METHOD OF OPERATION

This accident occurred on the De Soto district of the Missouri division, extending between Piedmont and Barracks, Mo., a distance of 117.25 miles, in the vicinity of the point of accident this is a single-track line over which trains are operated by time-table, train orders, and an automatic block-signal system. The accident occurred 1,028 feet south of the station at Sulphur Springs, at a point a few feet south of northbound automatic block signal 232, located just south of bridge 17, which is approximately 35 feet in height and 85 feet in length. Beginning at a point approximately 1 mile south of Sulphur Springs, the track is tangent for a distance of 1,529 feet, followed by a 2-degree curve to the left 1,294 feet in length, 220 feet of tangent, and a compound curve to the right 2,166 feet in length, the first part of which is 2° 48′ and the last part 1° 35′, the accident occurring on the latter portion, 800 feet from its leaving end. The grade is level for a considerable distance approaching the point of accident. In this vicinity the track lies between the Mississippi River on the east and on the west bluffs ranging from 12 to 100 feet in height. There is a water tank on the west side of the track located 416 feet south of Sulphur Springs station, approaching this point from the south, beginning at a point about 4,500 feet distant, the view of the water tank from the engineman's side of a northbound train is unobstructed for 1,000 feet, then obstructed for 500 feet, after which it is unobstructed for 700 feet. A clear view can be had of the rear end of a train, with the last car standing at signal 232, for a distance of 800 feet.



Signal locations and distances approaching point of accident

Beginning at a point about 4 miles south of the point of accident and proceeding northward, the following is the location of signals involved in this accident

Designation of signal	Distance from point of accident
	Feet
Automatic distant signal 262–D	20,392
Train order signal, Riverside	17,841
Automatic home signal 262	16,926
Automatic distant signal 232–D	3,273
Automatic home signal 232	(1)
Automatic home signal 220 (north)	5,500

[1] At point of accident

Distant signal 262–D is a Hall, type F, upper quadrant automatic signal arranged to operate in two positions, 45° and 90° It is controlled through automatic signal 262 and the northbound train-order signal at Riverside station The clearing relay of this signal is energized from a battery located at signal 232, through cut section track relays, and a circuit breaker on home signal 262, which is closed only when signal 262 is in the clear position

The mechanical train-order signal at Riverside passenger station, which is normally in clear position, is provided with a circuit breaker, normally closed to hold closed a relay at signal 262–D, so that both the train-order signal relay and automatic signal 262 must be in the clear position and the track clear to cause signal 262–D to indicate clear, when in the clear position this signal indicates that signal 262 and the train-order signal at Riverside are clear When in the 45° position it indicates that the track is occupied or that signal 262 is at stop, or that the train-order signal is set at stop, or both signals are at stop A time-table rule states that when the train-order signal at Riverside is in the stop position signal 262–D will indicate caution

Automatic home signal 262 is a Union Switch & Signal Co , style B, upper quadrant signal operating in two positions, 0° to 90°, and the control circuits are overlapped, extending to a point 1,197 feet north of automatic signal 232

Automatic distant signal 232–D is a Union Switch & Signal Co , style B, upper quadrant signal, operating in two positions, 45° to 90°, and its operating current is supplied from a battery located at signal 220 through track relays, line wires, and a circuit breaker on signal 232, which is closed only when signal 232 is in the clear position

Signal 232 is a Federal, type 4–A, upper quadrant, 3-position signal, and is controlled through a pole-changer on signal 220, through the track relays and line wires and overlapped to a point 1,063 feet in advance of signal 220

Signals 262–D and 232–D are distant signals to signals 262 and 232 Their mechanisms are so arranged that they operate only from 45° to 90°, and are designated as permissive signals Rule 501–B provides that the indication of a "permissive signal" in the 45° position is "Proceed with caution prepared to stop short of train or obstruction"

Signals 262 and 232 are "stop and proceed signals," and rule 501–AA provides that the indication of such signals in the horizontal position is "Stop, then proceed" Rule 509 further provides

509 When a train is stopped by a stop and proceed signal it may proceed with caution, expecting to find a train in the block, broken rail, obstruction, or switch not properly set

(*a*) On single track after waiting five minutes

(*b*) On two or more tracks after waiting one minute

Signals 262–D and 232–D are so located that they can be observed from a considerable distance Signal 262 is located on a curve and can be seen for a distance of approximately 900 feet Signal 232 is also located on a curve and can be seen for a considerable distance

The weather was clear at the time of the accident, which occurred at about 7 18 p m

DESCRIPTION

Northbound passenger train No 32 consisted of 2 baggage cars, 1 mail car, 1 mail and baggage car, 2 chair cars, 3 coaches, and 1 chair car, in the order named, hauled by engine 5310, and was in charge of Conductor J A Long and Engineman Gross The cars were of wooden construction, with the exception of the first and third cars, which were of all-steel construction, while the second and eighth had steel center sills Train No 32 arrived at Riverside, 3 55 miles south of Sulphur Springs, at 6 48 p m and headed in on a side-track to meet southbound train No 41, which departed at 6 55 p m After the departure of train No 41 train No 32 backed out of the siding, completed its station work, and departed at 7 07 p m , 2 hours and 11 minutes late, made stops at Bushburg and Glen Park, about 2¼ and 1⅛ miles, respectively, from Sulphur Springs, and stopped for water at the water tank at Sulphur Springs It had been standing at this point less than one minute when the rear end of the train was struck by train No 4

Northbound passenger train No 4 consisted of 3 baggage cars, 1 mail car, 2 baggage cars, 1 coach, 1 chair car, 2 coaches, 1 Pullman sleeping car, and 1 dining car, in the order named, hauled by engine 5312, and was in charge of Conductor Gregg and Engineman Glenn The cars were of all-steel construction, with the exception of the second and twelfth cars, which were of wooden construction, and the first and eighth cars, which had steel underframes Approaching

FIG 1.—View looking north from south end of bridge water tank on left, second car of train No 4 on bridge

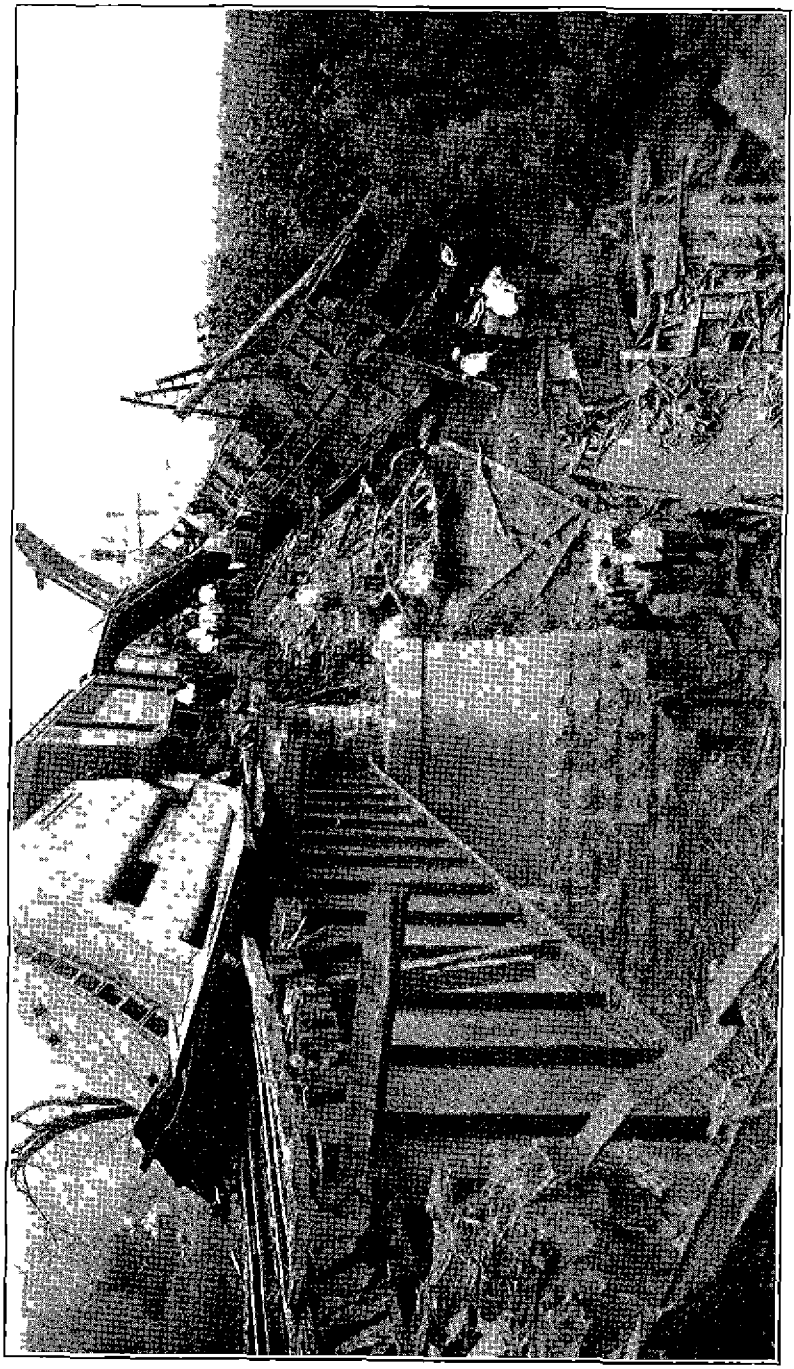


FIG 2.—View looking north from south end of bridge wreckage of cars of train No 32 on right equipment of train No 4 on and north of bridge

Riverside, distant signal 262–D was found in the caution position, and the speed of the train was reduced, the train-order signal at Riverside station was in the stop position, and the operator was on the station platform prepared to deliver train orders Without stopping, the crew received Form 19 train order No 51, reading—

No 1 Eng 5306 wait at Whitehouse until 7 37 p m Wickes 7 40 p m for No 4 Eng 5312,

together with a clearance card The train passed the station at 7 13 p m , passed home signal 262, distant signal 232–D, and when about opposite home signal 232 collided with the rear end of train No 32 while traveling at a speed estimated to have been 35 or 40 miles an hour

The last two cars in train No 32 were demolished, the débris being thrown to the bed of the creek, while the seventh and eighth cars were derailed to the right and came to rest down the embankment, badly damaged Although the rest of the equipment in this train was moved forward a distance of between two and three car lengths by the force of the impact, it was not derailed or materially damaged One pair of driving wheels on engine 5312 was derailed and the second car in train No 4 was demolished, none of the other equipment in this train was either derailed or materially damaged The employee killed was the engineman of train No 4

SUMMARY OF EVIDENCE

The investigation disclosed that the signal system in this vicinity was in proper working order both before and after the accident It is clearly established that distant signal 262–D was in the caution position, and all the evidence indicates signals 262 and 232–D were in stop and caution position, respectively, when passed by the engine of No 4, signal 232 was in the stop position at the time train No 32 stopped at the water tank Train No 32 had been at the water tank between 30 seconds and 1 minute when the collision occurred The conductor and flagman got off the train at the head end of the fourth car from the rear when the train stopped and no attempt was made to protect the rear of the train with a flag, as prescribed by the rules, prior to reaching the water tank the train had been at Riverside about 19 minutes, during 7 or 8 minutes of which it had occupied the main track and no flag protection had been furnished at that point

Conductor Long, of train No 32, stated that there was no regular place at which No 4 passed his train, when his train left De Soto, 16 miles south of Riverside, at 6 18 p m , he understood that it was 32 minuted ahead of No 4 and at that time he expected to make St Louis ahead of them, when his train was at Riverside he asked the operator how No 4 was, after consulting with the dispatcher the

operator said, "Try to make Wickes (4 2 miles north of Sulphur Spring) for No 1 and let No 4 pass there" When his train stopped at the water tank at Sulphur Springs the rear end of the last car in the train was south of signal 232, and he estimated that the train had been standing there 30 or 35 seconds when it was struck by train No 4 Conductor Long said he saw the flagman get off at Riverside at the rear end of the train and thought he went back, when the train was coupled up the flagman was at the rear of the train without being called in, he did not think that rule 99 should have been complied with at Riverside after being told that No 4 would not leave De Soto until 6 50 p m , 20 minutes late He admitted that had rule 99 been complied with at Riverside the attention of the engineman of train No 4 might have been called to the fact that they were following another train closely He stated that it was the practice on local trains for the flagman to assist in loading and unloading passengers on the two rear cars

Engineman Gross, of train No 32, stated that when his train passed home signal 262 it went to the stop position, and when his train approached distant signal 232–D it was in the caution position and had been that way some time, after the train stopped at the water tank at Sulphur Springs he started to get off preparatory to oiling around the front of the engine, but before he could get down off the step his train was struck by train No 4, he did not sound the whistle at Riverside for the flagman to go back to protect the rear of the train, but thought he called him in before leaving, he did not sound the whistle for the flagman to go back at Sulphur Springs because he did not think the train would be there long enough, he knew that his train was on the time of train No 4, but he had no idea where train No 4 was, the conductor had told him the dispatcher had said to make Wickes if they could for No 1 and to let No 4 by there He did not consider that his train should have left a flagman at Riverside, as it would have delayed train No 4

Fireman Long, of train No 32, stated that he had taken the water-spout down, but had not taken any water when the collision occurred He also stated that it was not customary to whistle for the flagman to protect the rear of the train at Riverside and that on the day of the accident the flagman was not called in before leaving that point

Flagman Boston, of train No 32, stated that it is his practice to ride the rear of the train until it reaches Riverside, where he assists in unloading passengers, and from that point he usually rides in the middle of the train, he did not do any flagging between Poplar Bluff and Riverside and did not flag at Riverside, although the train was there longer than usual, it had not been customary and he had never been instructed to do so, the engineman did not signal him to go back at Riverside, neither did he recall him before the train departed

He said that he did not know that his train was on No 4's time and did not know where No 4 was, only he had heard the operator at Riverside tell the conductor that No 4 would wait at Horine, about 3 miles south of Riverside, until 7 10 p m for train No 41, when the train arrived at Sulphur Springs he was on the leading platform of the fourth car from the rear, waiting to pull down to the station to unload passengers, his supply of torpedoes was in the can in the coal box on the rear car of the train with his lantern, and it would have taken three or four minutes to get them, he had lighted the markers on the rear of the last car, but did not know whether they were burning at the time of the accident Flagman Boston further stated that it is not the practice to flag when standing at stations, and that officials have ridden with him on the rear of trains on such occasions, but he has never been criticized, he said if officials are on the train the flagman usually gets on the rear of the train and makes some pretense of flagging He further stated that it is the custom when an unusual stop is made between stations for the engineman to signal the flagman to go back to protect the rear of the train, but the flagman does not wait for such signal before going back, except at station stops He understood that under the rules it is necessary to flag when on the time of another train, and admitted that under the rules he should have gone back to flag at Riverside and should have placed torpedoes on the rail

Fireman Tinsley, of train No 4, stated that before the train left De Soto the train dispatcher instructed them to look out for a "19" train order at Riverside, approaching Riverside the distant signal (262–D) was in the caution position, indicating that the train-order signal at Riverside was displaying red, the speed of the train was reduced to about 25 miles an hour, he got down on the step and caught the "19" train order from the operator and handed it to Engineman Glenn, who read it two or three times and handed it back to him, he then read it himself and returned it to Engineman Glenn, this is the last he can remember, he was unconscious for several hours after the collision He was unable to say exactly where the train was when he returned the order to Engineman Glenn, but it probably had passed home signal 262 Fireman Tinsley stated that as far as he knew the air brakes were working all right, he had no idea where train No 32 was He said that it was a common thing for the distant signal at Sulphur Springs to be in the caution position, but he did not think it customary to report distant signals when they are out of order He did not believe that it is the practice for the engineman to signal the flagman to go back to protect the rear of his train when making a station stop, it is, however, if the train is likely to be overtaken

The baggageman of train No 4 stated that the home signal north of Riverside (262) was in the stop position when the train passed it, the flagman of train No 4 stated that when he went back to flag immediately after the accident distant signal 232–D was in the caution position

Signal Supervisor Ragland was just south of Riverside when train No 4 passed and stated that the caution indication displayed by signal 262–D was observed by that train, as speed was reduced from 40 or 45 miles an hour to about 25 miles an hour approaching this point, and he saw fire flying from the brake shoes, after which speed was again increased Signal Supervisor Ragland proceeded to the point of accident on the relief train out of De Soto and at that time the automatic block signals displayed the proper indications, as follows Signal 262–D, caution, signal 262, stop, signal 232–D, caution, and although signal 232 was broken off as a result of the accident, examination of its mechanism disclosed it was displaying a stop indication at the time of the accident He further stated that the signals involved were tested the day prior to the accident and worked properly Signal Maintainer Trudo stated he inspected the signals on the morning of the day of the accident, and at that time they were in proper working order

A thorough examination of the signal apparatus in the vicinity of the point of accident disclosed that the signals involved were maintained in good condition, and nothing was discovered that would indicate that any one of them failed to function properly

The investigation disclosed that the air brakes on train No 4 had been tested and were working properly, that the engine was in good condition, and that Engineman Glenn had handled his train properly as far as Riverside on this trip

CONCLUSIONS

This accident was caused by the failure of Engineman Glenn, of train No 4, properly to observe and be governed by automatic block-signal indications, and by the failure of the crew of train No 32 to protect the rear of their train against following trains, as required by rule, for which Flagman Boston, Conductor Long, and Engineman Gross are responsible

The investigation disclosed that Engineman Glenn did not obey home signal 262 at stop, distant signal 232–D at caution, and home signal 232 at the point of the collision at stop Owing to the fact that Engineman Glenn was killed in the accident and the injuries sustained by Fireman Tinsley resulting in loss of memory, it is impossible to determine what occurred in the engine cab between the time the train orders were returned to Engineman Glenn and

the time of the collision, or obtain any information which will throw any light on the failure of the engineman to be governed by the signal indications and bring his train to a stop in time to avoid the collision

From the statement of Fireman Tinsley it appears that the caution indication of distant signal 262–D is usually interpreted as indicating that the train order signal at Riverside is displayed for train orders, and it is quite possible that after receiving the "19" train order at Riverside, Engineman Glenn accepted this interpretation and expecting to find home signal 262 clear failed to note its position On the other hand, it may be possible that as the engine was approaching and passing home signal 262 Engineman Glenn was engaged in reading the train order handed him by Fireman Tinsley and the signal thereby escaped his attention Whatever may have been the cause of his failure to observe home signal 262, it is apparent that he did not obey the indication of distant signals 262–D and 232–D, which required him to "Proceed with caution, prepared to stop short of train or obstruction," and home signal 232, which required him to stop, wait one minute, and then proceed

It appears from the evidence that distant signal 232–D is frequently found in the caution position, but investigation failed to disclose anything which would indicate that it was not properly so This condition probably resulted in the caution indication displayed by this signal being taken by enginemen as a matter of course, with the result that no positive action was being taken by enginemen when passing it in that position

In addition to the warning given by the automatic block signal indication, there was ample opportunity for Engineman Glenn to have seen train No 32 standing at the water tank, as he approached Sulphur Springs had he been alert, and his failure to do so can not be explained

The evidence points to the conclusion that Engineman Glenn was not complying with the rules relative to the observance of the caution indication of distant signals, but was relying entirely upon that of the home signals, and, upon approaching home signal 262, for some reason failed to observe its position and did not see signal 232 in the stop position or train No 32 until too late to avert the collision

The fact that his train was a fast train and naturally was given a clear track, and held a train order that train No 1, another fast train, would wait at Wickes until 7 40 p m for him very likely had a tendency to lead him to the conclusion that the road would be clear, and in view of this he was making every effort to reach Wickes as quickly as possible

The following general operating rules provide for flag protection for the rear of trains

35 The following signals will be used by flagmen Day signals—a red flag, torpedoes, and fusees

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

When signal 14 (*d*) or 14 (*e*) has been given to the flagman, and safety to the train will permit, he may return When the conditions require, he will leave the torpedoes and a lighted fusee

99 (*d*) Any knowledge of block system, whether automatic or manual, does not permit dispensing with the use or observance of other signals whenever or wherever they may be required, nor does it relieve any employee from taking every precaution required by train rules for protection

SPECIAL RULES FOR FLAGMEN

1421 It is then especial duty to protect the rear of their train in accordance with the rules, and they must allow nothing to interfere with the prompt and efficient discharge of this duty

1422 They must obey the signal from the engineman prescribed by the rules, but must never wait for such signal or for orders from the conductor when their trains need protection

SPECIAL RULES FOR ENGINEMEN

1542 They must be alert in all matters pertaining to the protection of their trains, and when it becomes evident to them that rear protection will be required they must immediately whistle out the flagman and repeat the signal until protection is assured

In this instance had these rules been complied with at Sulphur Springs alone it is doubtful, on account of the close proximity of the two trains, if the flagman would have had time to get back a sufficient distance to afford any substantial protection However, had these rules been generally observed at all stations, including Riverside, which would have required the leaving of torpedoes, an additional safeguard would have been provided, and it is quite likely that Engineman Glenn's attention would have been called to the fact that he was following another train closely, and he would have been more attentive to the signal indications and the conditions of the track ahead affecting the safety of his train

Flagman Boston's most important duty was to protect the rear of his train, yet according to his own statement he made no attempt to do so at Sulphur Springs, Riverside, or any other point where a regular stop was made, with the possible exception that when an official was aboard he made some pretense at it His only excuse for his failure was that it had not been customary and he had never been told to go back and flag under such circumstances Under the rules it was not necessary for him to be told to go back to protect the rear of his train, neither was it necessary, as far as he was concerned, for

the engineman to signal him to go back It was his primary duty to have a time-table, know the time of other trains which might in any way affect his train, be familiar with the train orders held by his conductor, and at all times, when necessary, protect the rear of his train on his own responsibility

Conductor Long was in charge of the train and it was his duty to know that Flagman Boston was obeying the rules, yet it is clearly apparent that he knew Flagman Boston was not doing so with respect to flagging and that it was not customary for him to do so For this negligence Conductor Long shares in an equal degree the responsibility of Flagman Boston for his failure to protect the rear of the train

Under the strict interpretation of the rule, Engineman Gross should have sounded the engine whistle and signaled the flagman to go back whenever the train stopped, this he did not do However, any responsibility borne by Engineman Gross in no way minimizes that borne by Flagman Boston and Conductor Long

This accident still further adds to the already appalling list of similar occurrences in which enginemen have failed to obey signal indications with disastrous results and but further emphasizes the necessity for the adoption of means which will automatically compel obedience to signal indications by taking the control of the train away from the engineman when for any reason obedience to block signals on his part is lacking An adequate installation of such a device in this instance would have prevented this accident

While not directly involved in this accident, investigation disclosed that train order No 50, held by trains No 41, 32, and 4, was not issued in the same words to all trains affected, each train did not hold a duplicate of that held by the others, and it appears that it is the practice for operators to copy only such portions of a train order as directly affect the trains for which they are being copied This is a dangerous practice and contrary to the rules of the railroad company

While the direct cause of this accident was the failure of an engineman to obey signal indications, the underlying cause was lax enforcement of the operating rules, for which the supervising officials of the Missouri Pacific Railway must bear the responsibility

A rule which requires a train receiving a permissive signal indication to proceed with caution prepared to stop short of train or obstruction clearly requires some positive action on the part of an engineman when approaching or passing such signal and the failure to comply with such a rule is a matter which could easily have been checked up by supervising officials

The lax practice in flagging disclosed by this investigation is also a matter which could scarcely have escaped the attention of the officials, and from the evidence in this case should have been well known to them According to the statement of Flagman Boston,

when officials were riding with them they made only a pretense of flagging

The violation of the rules in the improper handling of train order No 50 is another indication of lax observance of the rules and is apparently being condoned, as Superintendent Miller considered the rule was complied with and Dispatcher Eustes believed it a safe practice

The Missouri Pacific Railway Co should promptly take steps to secure proper obedience to its rules and regulations to prevent the recurrence of accidents of this character

Engineman Glenn had been employed as an engineman since 1890, in December, 1908, he was discharged for responsibility in connection with an accident, being reinstated in March, 1910, since which time his record was very good All the other employees involved were men of long experience At the time of the accident the crew of train No 32 had been on duty about 7 hours, previous to which they had been off about 14 hours The crew of train No 4 had been on duty about 4½ hours, previous to which, with the exception of the baggagemaster, they had been off duty 8 hours and 20 minutes The baggagemaster had been off duty about 25 hours

Respectfully submitted

W P BORLAND,
Chief, Bureau of Safety

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