

INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED AT THE IN- TERSECTION OF THE TRACKS OF THE CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC RAILROAD AND THE CHICAGO, ST PAUL, MINNE- APOLIS & OMAHA RAILWAY AT CAMP DOUGLAS, WIS, ON FEBRUARY 28, 1931

APRIL 3, 1931

TO THE COMMISSION

On February 28, 1931, there was a side collision between a passenger train of the Chicago, Milwaukee, St Paul & Pacific Railroad and a passenger train of the Chicago, St Paul, Minneapolis & Omaha Railway at the intersection of the tracks of the two railroads at Camp Douglas, Wis, which resulted in the death of 1 employee and the injury of 17 passengers, 2 employees, 6 mail clerks, and 1 Pullman employee. The investigation of this accident was made in conjunction with representatives of the Railroad Commission of Wisconsin.

LOCATION AND METHOD OF OPERATION

The accident occurred at the intersection of the tracks of the La Crosse and Portage subdivision of the La Crosse-River division of the Chicago, Milwaukee, St Paul & Pacific Railroad, and the Wyeville subdivision of the Eastern Division of the Chicago, St Paul, Minneapolis & Omaha Railway. The La Crosse and Portage subdivision extends between La Crosse and Portage, Wis, a distance of 102.9 miles, and in the vicinity of the point of accident is a double-track line over which trains are operated by time-table, train orders, an automatic block-signal system, and an automatic train-stop and cab-signal system of the continuous inductive type. Train movements on the Chicago, St Paul, Minneapolis & Omaha Railway, which is a single-track line, are governed by time-table, train orders, and an automatic block-signal system. The movements of the trains of both railroads over the crossing are controlled by means of an electric interlocking plant. The crossing is located at a point about 110 feet west of the station, which is situated in the angle between the tracks of the two railroads, these tracks intersect at an angle of 27° 56'.

Approaching from the west on the Chicago, Milwaukee, St Paul & Pacific, the track is tangent for a distance of 4,103 feet, followed

by a 2° curve to the right 740 feet in length, and then 971 feet of tangent track to the crossing. The grade is slightly descending, the maximum being 0.44 per cent for a distance of approximately 800 feet west of the crossing.

Trains approaching the crossing on the Chicago, Milwaukee, St. Paul & Pacific eastbound main track are governed by interlocking distant signal 141-8, a 1-arm signal which is also used as an automatic block signal and is located 4,956 feet west of home signal 3-R, which is a 2-arm signal and is located 721 feet west of the crossing. Except for the bottom arm of signal 3-R, which is fixed, these signals are of the 3-position, upper-quadrant type, displaying white, green, and red indications, for proceed, caution, and stop, respectively. The view of distant signal 141-8 is unobstructed for a distance of more than 1 mile, while a view of home signal 3-R, from the engineer's side of an approaching train, can not be obtained until a point 900 feet west of the signal is reached, due to the intervening curve and also a pole line located on the south side of the tracks.

A split-point derail operated in conjunction with the signals is located in the south rail of the Chicago, Milwaukee, St. Paul & Pacific eastbound track between the home signal and the crossing, the point of the derail being 546 feet west of the crossing.

The weather was cloudy at the time of the accident, which occurred about 3:47 a. m.

DESCRIPTION

Westbound Chicago, St. Paul, Minneapolis & Omaha passenger train No. 515 consisted of 3 express cars, 2 mail cars, 2 deadhead sleeping cars, 1 combination baggage car and coach, 5 sleeping cars, and 1 lounge car, in the order named, hauled by engine 601, and was in charge of Conductor Dilzer and Engineman Coleman. The first car was of wooden construction with a steel underframe and the remaining cars were of all-steel construction. This train arrived at Camp Douglas at 3:43 a. m., according to the train sheet, three minutes ahead of its scheduled departing time, and was standing with the tender of the engine on the crossing when it was struck by Chicago, Milwaukee, St. Paul & Pacific train No. 16.

Eastbound Chicago, Milwaukee, St. Paul & Pacific passenger train No. 16 consisted of 2 mail cars, 1 express car, 1 baggage car, 1 coach, 1 tourist sleeping car, 1 dining car, 5 sleeping cars, and 1 observation car, in the order named, hauled by engine 6409, and was in charge of Conductor Giggs and Engineman Taylor. All of the cars were of steel construction with the exception of the second car, which had a steel underframe. This train departed from La Crosse at 2:30 a. m., on time, passed Tomah, the last open office, 12.8 miles west of Camp Douglas, at 3:36 a. m., according to the train sheet, 16

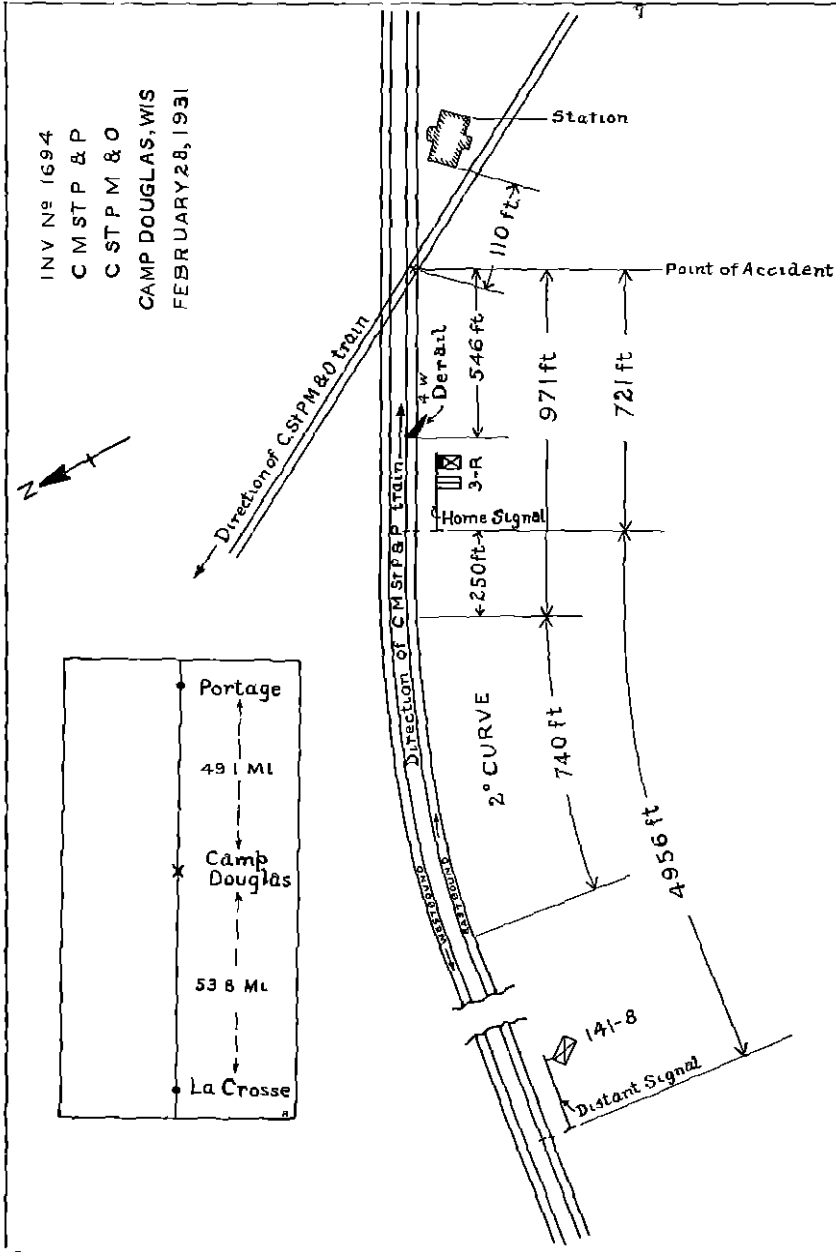


FIGURE 1—Track layout at Camp Douglas, with signals involved in accident

minutes late, passed distant signal 141-8 displaying a caution indication passed home signal 3-R displaying a stop indication, passed over the open derail, and collided with train No 515 while traveling at a speed estimated to have been from 30 to 40 miles per hour.

Chicago, Milwaukee, St Paul & Pacific engine 6409 collided with the left sides of the tender and the first car of Chicago, St Paul, Minneapolis & Omaha train No 515, passed over the crossing, and came to rest derailed and leaning to the right at an angle of 45°, near the west end of the station, in a badly damaged condition, the tender was also derailed but remained upright behind the engine. The first car of train No 16 stopped in an upright position in line with the Chicago, St Paul, Minneapolis & Omaha track and on top of the first car of train No 515. The second car of the Chicago, Milwaukee, St Paul & Pacific train stopped on the crossing, derailed and badly damaged, the front truck of the third car and one pair of wheels of the rear truck of the fifth car were also derailed, while the remaining equipment in this train was not derailed or damaged. Chicago, St Paul, Minneapolis & Omaha engine 601 was partly derailed and considerably damaged, and the tender and the first car of that train were derailed and badly damaged. The employee killed was the fireman of Chicago, Milwaukee, St Paul & Pacific train No 16, and the employees injured were the conductor and engineman of that train, the injured mail clerks, the Pullman employee and the passengers injured were also on Chicago, Milwaukee, St Paul & Pacific train No 16.

SUMMARY OF EVIDENCE

Engineman Taylor, of Chicago, Milwaukee, St Paul & Pacific train No 16, stated that approaching distant signal 141-8 he could see the indication for a distance of 1 or 1½ miles, it was displaying a caution indication and when about one-half mile from the signal he shut off steam and made a 12-pound brake-pipe reduction, and as he passed the signal a green light or caution indication was displayed by the cab signal, accompanied by the cab whistle indicator. He operated the acknowledging lever of the automatic train-stop device, and as soon as the cab whistle ceased sounding, this whistle continuing for seven seconds, he made a second brake-pipe reduction of 10 or 12 pounds. Due to smoke from his engine drifting back along the right side of the cab, he was unable to ascertain his location or determine whether or not the speed of his train had been materially reduced, and after passing the distant signal he did not determine his location again until he was passing the stockyards, which are located approximately 1,700 feet west of the crossing, he at once applied the air brakes in emergency and told his fireman that he

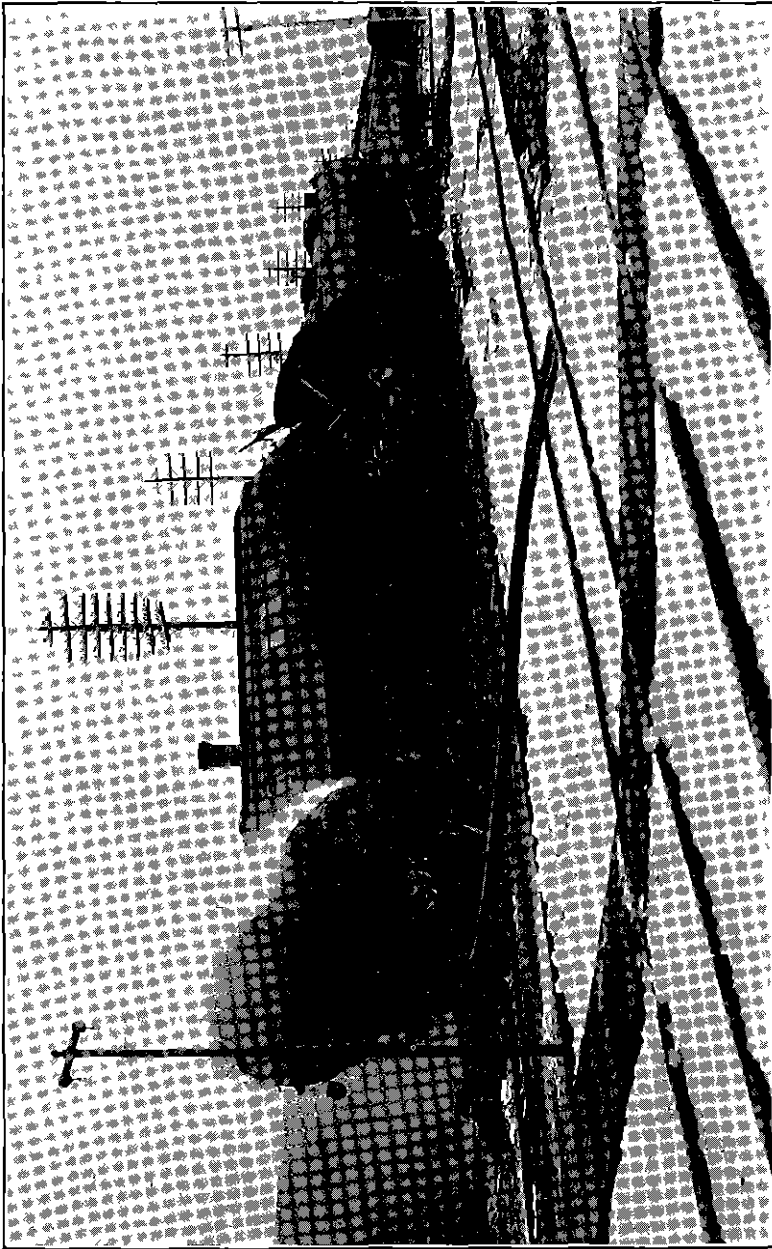


FIGURE 2—General view of wreckage, north side Milwaukee engine on left, Omaha engine on right

would be unable to stop the train before reaching the derail. He stated that he did not release the air brakes at any time after he made the first reduction some distance west of the distant signal, and he did not think the brakes held properly when he applied them in emergency. Engineman Taylor stated, however, that an air-brake test had been made at La Crosse, a running test was made after departure from that point, and a stop was made at Sparta, 29.2 miles west of Camp Douglas, and each time the brakes functioned as intended. Engineman Taylor was thoroughly familiar with this territory as well as with the type of engine involved in the accident,

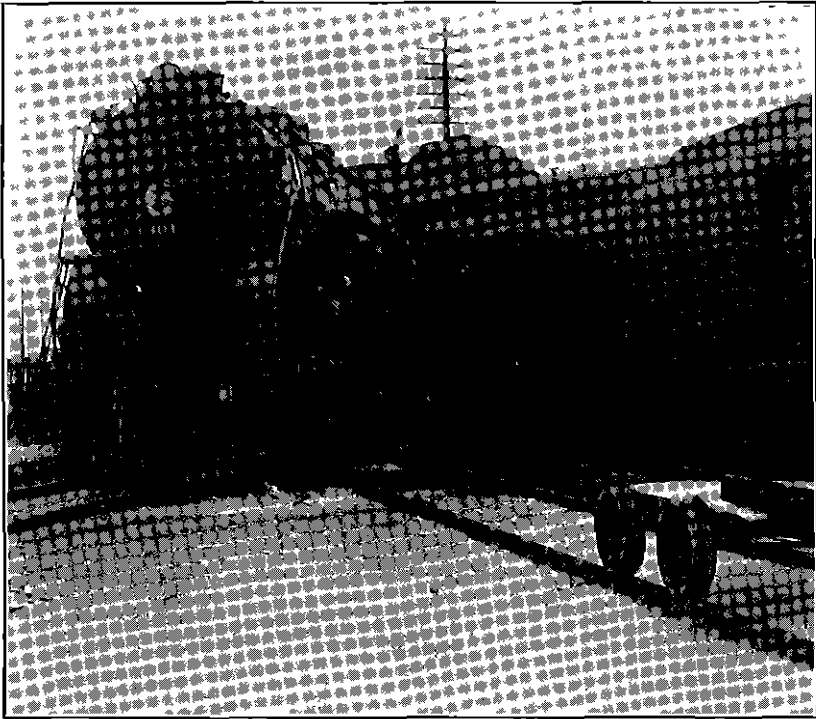


FIGURE 4—Omaha engine with Milwaukee train on right

which was of the 4-6-4 type, with 79-inch drivers. In this connection he made the further statement that when the wind was from the right direction the smoke from these engines, when steam was shut off, would prevent an engineman from seeing anything. Engineman Taylor was unable to estimate the speed of his train at the time he made the first brake-pipe reduction west of the distant signal, nor was he able to estimate the speed when he made the second reduction, because of the fact that he could not see anything on account of the smoke drifting down on his side of the engine, and while he said that he could not give any idea of how fast his train was traveling

when he applied the brakes in emergency, at or after passing the stockyards, he thought the speed must have been 30 or 35 miles at that time. It is to be noted in this connection that Engineman Taylor's statements indicated he was much concerned about making the time on train No. 16, for at one point when questioned as to whether he was making normal speed at the time of applying the brakes, he replied that this was his first trip on this train and that he was losing time all the way, at another point he said he remarked to the fireman, at the time of making the first reduction west of the distant signal, that "Here is where we are going to get hung up again for five or six minutes", and at another point, when asked if he used the brakes at the time of passing through Tomah so as to facilitate the dispatching of the mail, he replied that he just let the train drift, that he was losing time, and that an engineman could not be reducing speed here and there and make the time of train No. 16.

Conductor Griggs, of Chicago, Milwaukee, St. Paul & Pacific train No. 16, stated that he was riding in the front end of the fifth car, at a point more than 1 mile from Camp Douglas he noticed an application of the air brakes, which were held applied for several seconds and then were released. He knew when he passed the distant signal and then a heavy application of the brakes was made, it appeared to him that the brakes were only partly released after this second application, followed almost immediately by a very heavy application, and at that time the train had passed the home signal. He estimated the speed of the train to have been 65 miles per hour when the first application was made, that it had been reduced to 45 or 50 miles per hour when the final application was made, and that it was about 40 miles per hour at the time of the accident. Conductor Griggs stated that the brakes had been properly tested, and functioned satisfactorily en route. He further stated that when he talked with Engineman Taylor at La Crosse the engineman appeared to be in normal physical condition. Conductor Griggs felt that the engineman was considerably concerned about making the time on train No. 16, however, and cautioned him to reduce speed at Tomah to facilitate the dispatching of the mail, and also called his attention to the fact that the Omaha train always held them at the crossing at Camp Douglas about six or seven minutes. Engineman Taylor, however, denied that anything along this line was said to him by the conductor.

Head Brakeman Bartlett of Chicago, Milwaukee, St. Paul & Pacific train No. 16, who was also riding in the fifth car, stated that he felt an application of the air brakes before reaching distant signal 141-8, followed by two other applications, but he was unable to make any definite statements concerning these applications—

whether or not the brakes had been released at any time, or at what points the brakes had been applied. He estimated the speed of the train to have been 30 or 35 miles per hour at the time of the accident. The statements of Rear Brakeman McQueeney and Baggageman Waterman brought out no additional information of importance, except that the rear brakeman felt only the first application of the brakes, west of the distant signal, and the baggageman noticed two applications but did not know just when they were made.

The members of the crew of Chicago, St. Paul, Minneapolis & Omaha train No. 515 were not able to give any information of importance relative to the occurrence of this accident.

Operator Gilmore, on duty at Camp Douglas, stated that the interlocking plant was lined for the Chicago, St. Paul, Minneapolis & Omaha train at 3:40 a. m., the train arriving at 3:43 a. m., and that it was 3:45 a. m. when Chicago, Milwaukee, St. Paul & Pacific train No. 16 came upon the annunciator circuit on that road. Shortly afterwards the home signal indicator dropped and he then realized that train No. 16 was passing the home signal and started for the door, but by the time he reached it the accident had occurred.

Car Foreman Moran stated that he made an inspection of the equipment of train No. 16 about one hour after the occurrence of the accident and found that the brakes were set on all the cars with the exception of the first and second cars, which were so badly damaged that he was unable to inspect them. There was no excessive piston travel on any of these cars. The eight rear cars were later assembled in a train on the Chicago, St. Paul, Minneapolis & Omaha preparatory to detouring and an air-brake test was made before their departure from Camp Douglas, all of the brakes were found to be operating properly and there was no excessive piston travel. Car Foreman Moran also stated that he found a broken truck pedestal and a brass, between the derail and the crossing, and it was his opinion that it was car wheels, and not the engine-truck wheels, that made the marks which were found on the track alongside the rails, east of the derail.

Traveling Engineer Little, who arrived at the scene of the accident shortly after its occurrence, stated that he inspected engine 6409 and found the throttle closed, the reverse lever in the full forward gear, the automatic brake valve in the emergency position, and the lever of the acknowledging valve in the acknowledging position. He also inspected the rear nine cars in company with Car Foreman Moran, and found that the brakes were set on these cars. Mr. Little further stated that instructions to the enginemen were that they should forestall an automatic application of the brakes, and it was his opinion that in this particular case, if the

train approached the distant signal at a speed of 60 miles per hour, it would be necessary to start braking immediately after acknowledging the signal indication, to this extent Engineman Taylor followed instructions. It also appeared from his statements that there had been considerable trouble on engines of this type, due to smoke obscuring the view of enginemen, it had been reported to his superior officers and had been brought up at several meetings. The engines were long, and the blower was not adequate to take care of the smoke, and the result was that they increased the orifices in the blower so it would take care of the smoke.

Roadmaster McMahon stated that he arrived at Camp Douglas about three hours after the occurrence of the accident and on inspecting the track and derail, he found the derail open and the 22-foot point still connected. The derail was not broken, but the heel-joint casting and bolts were broken, and the main track rail at the heel joint also was broken at a point about 14 inches from its receiving end and its end badly battered. The heel of the split-point derail was displaced to the north 4 or 5 inches, leaving the receiving end of the main track rail at gage, which permitted all the wheels except the engine-truck wheels to be derailed at that point, and it was his opinion that the flange marks found on the ties and tie-plates on the south side of each main rail between the derail and the crossing, beginning 15 feet east of the point of derail, were caused by the wheels of the engine truck.

Seven of the cars in train No. 16 were equipped with UC brake equipment and six with LN equipment. General Air Brake Supervisor Elder stated that in his opinion an emergency application following a heavy service application might or might not have been effective on the cars having LN equipment, but that full emergency effect was obtained on all the cars having UC equipment. Mr. Elder also stated that a test had been made of the train-stop device and they found it would stop a train in a little less than 3,000 feet from a speed of 60 miles per hour, on a slightly descending grade.

Signal Maintainer Stowell, located at Camp Douglas, stated that very soon after the occurrence of the accident he inspected the interlocking plant, including signals and derail, and found it to be operating perfectly.

CONCLUSIONS

This accident was caused by the failure of Engineman Taylor, of Chicago, Milwaukee, St. Paul & Pacific train No. 16, properly to control his train in accordance with the rules and signal indications when approaching a crossing upon which a train of the other line was standing.

On both of the lines, which cross at Camp Douglas, movements of trains are governed by automatic block signals, the crossing itself is protected by a modern electric interlocking plant, and on the Chicago, Milwaukee, St Paul & Pacific Railroad in this territory an automatic train-stop and cab-signal system is in service. All of these appliances were in proper operating condition. According to Engineman Taylor's statement, all the signals were against him. He received an approach indication at signal 141-8, which under the rules required him to "approach next signal prepared to stop", when his engine passed that signal, a caution indication of the cab signal was displayed, which required him to "proceed with caution—prepared to stop at next signal," and he received a stop indication at signal 3-R. Engineman Taylor stated that he shut off steam and made a brake-pipe reduction of about 12 pounds when approximately half a mile west of the distant signal, that he made a second reduction after operating the acknowledging valve of the automatic train-stop device at the distant signal so as to prevent its operation to cause an automatic application of the brakes, and that his view was so obscured by smoke from his own engine that he was unable to determine whether the speed of his train was being properly reduced or to be certain at all times of his exact location. When he recognized a landmark, however, he realized that he was approaching the derail and crossing at excessive speed, and he made an emergency application of the brakes, but it was then too late to avoid overrunning the stop signal and derail, and to avoid striking the train on the crossing. Engineman Taylor said he thought the brakes did not hold properly, however, tests and operation both prior to and after the accident established the fact that the brake equipment on this train was in good operating condition. In view of the estimated speed of this train at the time of the collision, and the damage and destruction resulting therefrom, it is clearly apparent that Engineman Taylor very greatly underestimated the speed at which his train was approaching this crossing. His statement indicates, however, that his mind was intent upon making schedule time and that he felt considerable concern because this was his first trip on that train and he was running late and losing time. There is some discrepancy in the evidence as to the manner of brake operation when approaching the point of accident, but the testimony of all witnesses was that the brakes were applied before reaching the distant signal and that a second reduction was made immediately after acknowledging at the distant signal. The evidence shows that Engineman Taylor saw and correctly understood the restrictive signal indications, and that the brakes on his train were in good operative condition, the results of the accident clearly show that he ap-

proached the point of accident at a rate of speed materially in excess of the requirements of safety. The derail at this point was damaged, apparently due to the severe strain resulting from the high rate of speed when train No. 16 passed over it, and failed to accomplish its intended function.

In operating the acknowledging device at the distant signal and thereby forestalling an automatic application of the brakes by means of the automatic train-stop device, Engineman Taylor was acting in conformity with the rules and instructions in effect. His statement that his view became obscured by smoke does not constitute an excuse, when that occurred he should at once have taken the necessary steps to bring his train under proper control.

In this connection, it is believed the rules of the railroad company are not wholly adequate to guard against an accident of this character. In the "Catechism for the Instruction and Examination of Enginemen on the U. S. and S. Co.'s Automatic Train Stop Equipment," issued by General Air Brake Supervisor Elder of this road, the following appears:

p. 105 This immediately causes the "Green" caution light to be displayed, and the warning whistle to be sounded, and requires the engine man to operate the acknowledging valve to avoid an automatic brake application.

The rules of this company are not as definite and explicit as they should be concerning the action which should be taken by the engineman after receiving a restrictive indication and forestalling an automatic brake application. The approach indication of an automatic block signal means "approach next signal prepared to stop", the caution indication of the cab signal means "proceed with caution". In reports of this bureau and of the commission it has been repeatedly pointed out that the approach or caution indication should require some definite action at once on the part of the engineman, and not leave it wholly to his judgment to take some action at a point in advance or a time in future.

This question has been discussed in many reports dealing with accidents which have occurred in territory protected by automatic block signals. One of the earliest was the report covering the accident which occurred on the New York, New Haven & Hartford Railroad near Milford, Conn., on February 22, 1916, wherein the following statement was made:

The record in this case, together with a careful consideration of the diagram, brings forcibly to mind that the rules permit the distant signal indication to be observed with less exactness than is the home signal indication. Distant signal indications are as positive as home signal indications. Under the present practice of the New Haven Railroad, the distant signal at caution indicates to the engineman that he should prepare to stop at the next signal. This is practically the same as the standard code of the American Railway Association for three-position signaling. This is not as definite and

clear cut a rule as that given for the indication for the home signal, which says 'stop,' leaving in the latter case nothing to the discretion of the engineman. Without such a positive rule, especially with men feeling the pressure to make time, there is a great chance for error in reading, or for looseness in observance of, the distant signal. To be consistent with other signal rules which require a positive definite action on the part of the engineman, in order to provide proper safety in the operation of its trains existing rules should be so modified that at the distant signal in the caution position a train shall be brought under control as quickly as possible by the engineman and maintained in such a state until the indication of the next succeeding signal is accepted. Such an observance of the caution indication would not mean delay at every distant signal, but with proper signal locations, after the second train had slowed down for the first caution signal encountered, it should receive clear signals thereafter, unless it were overtaking the preceding train. Such a practice may occasion slight delays in automatic signal territory with long blocks, nevertheless, speed must always be subordinate to safe operation.

The subject was again discussed in the thirtieth annual report of the commission to Congress, covering the fiscal year 1916, as follows:

The investigation of collisions occurring in automatic block signal territory during the past year has demonstrated the imperative need of a revision of the rules and a change in the practices pertaining to the observance of caution signal indications. Under existing rules when a distant signal displays a caution indication an engineman is not positively required to reduce speed at once, the only requirement being that he shall approach the next signal with his train under control and prepared to stop. Frequently no reduction of speed is made when a caution signal indication is displayed, the investigation of one serious rear-end collision during the past year disclosed that the following train had been running under caution signal indications for a considerable distance without any reduction in speed, the preceding train had stopped only a short distance in advance of a home signal, and when the danger indication of that signal was recognized by the engineman of the following train he was too close to the signal to bring his train to a stop before passing it or in time to avert the collision.

The indication of a distant signal should convey an order to the engineman as positive and definite as the indication of the home signal. The home signal at danger means "stop", this is a positive order, requiring an engineman to act immediately. It is extremely desirable from the standpoint of safety that the caution indication of a distant signal should require an engineman to reduce speed at once and approach the next signal with caution prepared to stop.

Immediate reduction of speed at a caution signal would reduce the danger of collisions similar to the one described, as well as the danger of shock and injury to passengers resulting from emergency applications of the brakes. It is also desirable from the standpoint of economy which would follow from smoother handling of trains and consequent reduced wear and tear on train equipment. The enforcement of such a requirement would also create a different habit of thought on the part of the engineman, relieving certain nervous tension and insuring that the train could be stopped safely if the next signal was in danger position. In addition, such a practice would give the flagman more time and better opportunity to protect his train whenever it was unexpectedly stopped. Only by requiring the engineman to take positive action at the point of indication can safety be assured.

This matter has also been discussed in several accident investigation reports since that time. In the report covering the accident which occurred on the Boston & Maine Railroad at Dummerston, Vt., on September 10, 1918, attention was called to the fact that the rule governing the observance of the caution indication provided only that the train should proceed prepared to stop at the next home signal, and in connection with this rule the following statement was made:

This rule permits the engineman to use his judgment as to when he shall begin to reduce speed in anticipation of a possible stop at the next signal. The danger in this interpretation of the caution indication has been pointed out in previous reports of accidents investigated by this Bureau. The interests of safety demand such modification of this rule as will cause the caution indication to be recognized as being as positive in its indication and requiring as definite action on the part of the engineman as does the stop indication.

In the report covering the accident which occurred on the Boston & Albany Railroad near Worcester, Mass., on June 15, 1920, reference was made to previous comments in connection with the necessity for the taking of definite action at the distant signal location and after quoting from the commission's sixteenth annual report, it was stated that "Had such an interpretation of the distant signal indication been in effect on this railroad, this accident would probably have been prevented." The matter was again referred to in the report covering the accident which occurred on the Northern Pacific Railway at Lake Park, Minn., on November 20, 1926, wherein the following statement was made:

In previous accident-investigation reports attention has been called to the failure of enginemen to begin braking when passing a signal in the caution position, and to day the rules of some railroads require the taking of positive action at the distant signal. This is believed to be a much better practice, and the enforcement of a rule of this kind should easily result in a train being brought under control as to make it a simple matter to stop if necessary before passing the succeeding signal.

The matter was again discussed in the report covering the accident which occurred on the New York Central Railroad at Savannah, N. Y., on January 9, 1927, involving sections of the Twentieth Century Limited. In this case there had been a somewhat similar accident on the same railroad at Foytsyth, N. Y., on December 9, 1923, also involving sections of the Twentieth Century Limited, and it was pointed out that in the case of each of these two accidents the engineman of the following train saw the caution indication of the distant signal but failed to take adequate steps toward bringing his train to a stop at the home signal, and the Savannah report then went on to state as follows:

Several months after the occurrence of the Foytsyth accident the New York Central rules were modified to the extent of requiring that when an engineman

observes a signal displaying a caution indication he is to proceed at a speed not in excess of one-half the authorized maximum speed. The accident here under investigation simply lends further emphasis to what has been pointed out on many previous occasions, which is that the time to begin bringing a high speed train under control is at the distant signal location.

Attention is also called to our report covering the accident which occurred on the Atchison, Topeka & Santa Fe Railway near Flagstaff, Ariz., on May 23, 1927. In that case the engineman said he had passed two signals displaying caution indications, one of which changed from caution to proceed before his engine reached it, and that he then had passed three more caution signal indications before encountering the stop indication governing the block in which the accident occurred. The rule on that railway required the train receiving a caution indication to proceed under control, and under "control" was defined as the ability to stop a train within the distance the track is seen to be clear. In this case the rule was adequate, as distinguished from some of the instances referred to above, but as in all of the above cases the engineman failed to take proper action at the distant signal location and to control his speed properly while moving through the block. The report then went on to state that the matter of trains following each other so closely as to result in receiving caution indications at successive signal locations had been previously discussed, and a quotation was made from the report covering the accident on the New Haven Railroad near Milford, Conn., which quotation is included above in the present report.

In the American Railway Association's standard code of block signal rules, as revised in January, 1928, the approach indication of a block signal as shown in rule 285 is "Prepare to stop at next signal. Train exceeding medium speed must at once reduce to that speed." A number of railroad companies have adopted rules in conformity with this provision of the standard code. This principle is recommended.

The foregoing statements apply with even added force where automatic train-stop devices are in service. These devices, or the greater portion of them, were installed by the carriers pursuant to orders of this commission. By the order of June 13, 1922, prescribing specification and requirements for automatic train-stop devices, it was required that the device bring the train to a stop, after which the engineman could restore the apparatus to normal condition and the train be permitted to proceed. At the solicitation of the carriers, however, this requirement was modified by the order of July 18, 1924, by permitting the use of a foreshalling device by means of which the engineman could foreshall an automatic application of the air brakes and then "control his train in the usual manner in accordance with hand signals or under limits fixed by train order or pre-

scribed by the operating rules of the company” The use of a forestalling device is not required, and the statement was made in the concurring opinion in the proceeding upon which the order of July 18, 1924, was based, that “If experience shows that the permissive feature does not fulfill its purpose we can at any time require its elimination”

On some railroads the rules provide that an engineman shall not forestall an automatic brake application until a restrictive signal has been observed and “is being obeyed” This provision, together with the interpretation of approach and caution indications referred to in the foregoing, evidences a proper appreciation of the safety questions involved and should be incorporated in the rules of all railroads using devices of this character

Automatic train-control and train-stop devices installed pursuant to orders of the commission have been in service for periods of from five to seven years or longer During this time a number of accidents have occurred where these devices were in service, and the following is a summary concerning those which have been investigated by this bureau

Date	Railroad	Location	Kind of accident	Persons—		Type of device	Notes
				Killed	Injured		
Dec 4, 1924	Key System Transit Co	Oakland, Calif	Collision, rear end	9	28	Mechanical trip stop, overhead type	Train stop as installed did not provide sufficient braking distance
Nov 16, 1926	New York, Chicago & St Louis and Pennsylvania	West Fort Wayne Ind	Collision, side	0	3	Intermittent induction stop	Engineman forestalled at caution signal and proceeded at 60 miles per hour rule required him to proceed at 25 miles per hour. His failure properly to control speed was direct cause of accident
Nov 10, 1927	Southern	London, Tenn	Derailment	1	5	do	Malicious tampering, receiving end of rail moved inward 4 or 5 inches, not enough to break bond wire
Feb 15, 1928	do	Fluppen, Ga	Helper crushed ca boose	1	2	do	Passenger train helping freight train, latter broke in two and passenger engine crushed caboose, car not cut through
Mar 16, 1928	Pennsylvania	Marsh Run, Pa	Collision, rear-end, and 2 d railments	1	21	Passenger tracks had continuous stop with cab signals	Wreckage from freight train fouled passenger tracks when passenger train was only few car lengths distant
Apr 10, 1928	Southern (Cincinnati, New Orleans & Texas Pacific)	Danville, Ky	Collision	1	23	Intermittent induction stop	Engineman forestalled at caution signal, switch 557 feet beyond signal opened at about this time, engine crew did not know it until engine entered open switch
May 2-, 1928	Chicago, Indianapolis & Louisville Southern	St John, Ind	Derailment	2	0	do	Trailer of motor truck stalled on highway grade crossing
July 18, 1928- Jan 21, 1929	do	Shannon, Ga Lands, N C	do Collision, head end	1 0	23 1	do do	Broken rail Train backed through crossover without adequate flag protection, movement started after opposing train passed last signal, 9,637 feet from crossover, rule to wait 2 minutes, with long distance between signals, does not provide adequate protection
May 14, 1929	Michigan Central	Dowagiac, Mich	Derailment	1	5	do	Motor truck driven on highway grade crossing in front of approaching train
May 15, 1929	Southern	Dallas Ga	do	1	1	do	Failure of truck bolster
July 2, 1929	Chicago, Rock Island & Pacific	Metz, Iowa	do	0	18	Intermittent contact, 2 speed control	Loose wheel
July 10, 1929	Atlantic Coast Line	Enfield, N C	do	0	50	Intermittent induction stop	Track stripped for ballasting and ends of ties not properly supported
July 11, 1929	Erie	Corning, N Y	2 derailments	6	66	do	Broken rail, no opportunity to flag passenger train approaching on adjoining track
July 15, 1929	Chicago, Milwaukee, St Paul & Pacific	Tomah, Wis	Derailment	2	6	Continuous stop with cab signals	Engineman had order not to proceed beyond ten foot crossover without further orders assumed first order would be annulled and when operator opened crossover switch, after train had passed last signal, cab signal displayed red but distance was too short to stop

Date	Railroad	Location	Kind of accident	Persons—		Type of device	Notes
				Killed	Injured		
Oct 29, 1929	Southern (Alabama Great Southern)	New England Ga	Deraiment	1	0	Intermittent induction stop	Defective switch set automatic signals at stop or der issued to pass signals without stopping, looking out for obstructions etc. engineman rounding curve thought switch points properly closed Excessive speed on curve
Nov 11, 1929	Southern (Cincinnati New Orleans & Texas Pacific)	Glen Mary Tenn	do	4	81	do	
Dec 1, 1929	Lehigh Valley	Mauch Chunk Pa	Collision, head end	0	2	oc	Failure to provide adequate flag protection for movement against current of traffic engineman forestalled at caution signal and struck opposing train 4,110 feet beyond and 1,170 feet short of succeeding signal.
Jan 20, 1930	Southern (Cincinnati, New Orleans, & Texas Pacific)	High Bridge Ky	do	0	2	- do	Failure to provide adequate flag protection for back up movement, each engineman operated fore stalling lever before entering block in question
Jan 22, 1930	New York Central	Beres, Ohio	Collision	10	1	- do	Motor bus driven on highway grade crossing in front of approaching train
Mar 2, 1930	Southern	Rome, Ga	Collision, rear end	0	33	do	Engineman forestalled at caution and calling on signals and then failed to control speed properly when entering station
May 18, 1930	Lehigh Valley	Bear Creek Junction Pa	-do	0	3	do	Engineman forestalled at caution signal and then failed to control speed properly on long descending grade. caution signal nearly 10,000 feet from stop signal
July 19, 1930	Pennsylvania	South Elizabeth, N J	Deraiment	1	69	Continuous cab signals	Automobile on track at point where there was no highway grade crossing
Dec 2, 1930	Pere Marquette	Ann Pere, Mich	do	0	3	Intermittent induction stop	Engineman forestalled at caution signal and then failed to control speed properly
Jan 24, 1931	Southern (Cincinnati, New Orleans & Texas Pacific)	Helenwood, Tenn	do	5	10	do	Excessive speed on curve
Feb 28, 1931	Chicago, Milwaukee, St Paul & Pacific (Chicago, St Paul, Minneapolis & Omaha)	Camp Douglas, Wis	Collision, side	1	26	Continuous stop with cab signals	Engineman failed to control speed properly approaching crossing
Mar 6, 1931	Michigan Central	Dearborn, Mich	Deraiment	0	3	Intermittent induction stop	Under investigation
Mar 16, 1931	Pennsylvania	Bristol, Pa	do			Continuous cab signals	Do
Mar 19, 1931	Chicago, Indianapolis & Louisville	Guernsey, Ind	Collision head end			Intermittent induction stop	Do

At the time of preparation of this report, investigation of the last three accidents listed had not been completed. Of the other 26 accidents, 4 were due to striking motor vehicles, 2 to excessive speed on curves, 2 to defective equipment, 2 to broken rails, 1 to malicious tampering, 1 to a break-in-two, 1 to track stripped preparatory to ballasting, and 1 to debris from a freight wreck fouling an adjoining track directly in front of an approaching train. All of the other 12 accidents were of a type which train-control devices should have prevented, in 1 case the train-stop device as installed did not provide adequate braking distance, in 1 case there was a defective switch and the signals displayed the proper indications, but the engineman had received instructions that the signals were not working and did not notice the condition of the switch until the accident occurred, and in 5 cases the condition of the block was changed either by another train or an open switch after the approaching train had passed the last signal. In four of these last-mentioned cases the type of installation on the particular road involved did not afford the engineman any warning of the changed condition, while in the other case such a warning was given but the distance was too short to enable the engineman to stop. In each of the remaining five instances the engineman forestalled the automatic application of the air-brakes and then failed properly to control the speed of his train. Four of these have occurred within the past year.

Engineman Taylor, who had had nearly 30 years' experience as an engineman, had been on duty less than 2 hours at the time of the accident, prior to which he had been off duty 20 hours and 27 minutes, all of the other 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, *Director*