

IN RE INVESTIGATION OF ACCIDENTS WHICH OCCURRED ON THE UNION PACIFIC RAILROAD, AT HILLSDALE, WYO, ON NOVEMBER 4, AND AT BORIE AND BUFORD, WYO, ON NOVEMBER 5, 1922

To the Commission:

On the night of November 4, 1922, there were three rear-end collisions on the Wyoming division of the Union Pacific Railroad, the first occurring at Hillsdale, Wyo, 198 miles east of Cheyenne, at about 11.55 p.m., the second at Borie, Wyo, 9.5 miles west of Cheyenne, at about 12.30 a.m., and the third at Buford, Wyo, 27 miles west of Cheyenne, at about 1.45 a.m.

That part of the Wyoming division on which these accidents occurred is a double-track line, over which trains are operated by timetable, train orders, and an automatic block-signal system. The fifth subdivision, extending between Cheyenne and Laramie, a distance of 567 miles, embraces what is known as Sherman Hill, Sherman is about halfway between Cheyenne and Laramie, and the grade is generally ascending eastward from Laramie to Sherman and descending from Sherman to Cheyenne. During the night on which these accidents occurred this section of the country was visited by a severe storm, rain, sleet, and snow were accompanied by a wind which, according to the records of the Weather Bureau at Cheyenne, attained a velocity of 59 miles an hour at 12.17 a.m. Approximately, 11 inches of snow fell between 6 p.m. November 4 and 6 a.m. November 5. The temperature at midnight November 4 was 28 degrees above zero. All westbound trains out of Cheyenne were stopped at 9.15 p.m. while all eastbound freight trains out of Laramie were stopped at 9.30 p.m., the next and also the last train to move eastward from this point being train first No. 6, which was involved in the accident at Buford. Train operation was not resumed in either direction until the afternoon of November 6. Communication also was badly disrupted, the manager of telegraph advising that wire trouble began to develop at 10.40 a.m. November 4, and that by 8.45 p.m. all wires were lost, both east and west of Cheyenne, east of Cheyenne 17 miles of poles were down.

The statements of all employees were to the effect that the difficulties of ordinary train operation were materially increased, in many cases train employees did not know where their trains were, many signals were passed without their indications being seen and in some cases without train enginemen even seeing the mast supporting a signal, fuses at times could only be seen two or three car lengths, whistle signals were generally inaudible for any material distance, the general direction of the storm to some extent the same as the direction in which the trains involved were moving, all of which were east bound trains, contributing toward making judgment of speed largely a matter of guesswork.

In none of the accidents investigated was there anything to indicate that the signal system or any of the equipment of the trains involved was not in good condition, the difficulties which existed being due solely to the storm.

In view of these general conditions surrounding the occurrence of each accident, the facts concerning each will be briefly given

#### ACCIDENT AT HILLSDALE

The accident at Hillsdale was between two freight trains and did not result in any deaths or personal injuries.

Location - This accident occurred on the fourth subdivision, which extends between Sidney, Nebr, and Cheyenne, the point of accident being 5,047 feet west of the station at Hillsdale. Approaching this point from the west the track is tangent for several miles, while the grade

at the point of accident is about 05 per cent descending. The automatic signals are of the two-arm, two-position, lower-quadrant type, signal 4916 is located 5,491 feet west of the point of accident, while 6,798 feet farther west is signal 4930.

Description - Eastbound freight train extra 2257 consisted of 48 cars and a coach used as a caboose, hauled by engine 2257, and was in charge of Conductor Nugent and Engineman Cunningham. It left Cheyenne, according to the train sheet, at 925 p.m., found signal 4930 in the caution position and signal 4916 in the stop position. After remaining at signal 4916 for a period of about 1 hour and 15 minutes, during which time an inspection of the train was made, extra 2257 proceeded, with the signal still in the stop position, and after proceeding about 1 1/4 miles was flagged by the flagman of extra 2232, which was stalled in the snow. The flagman of that train thought his train was east of the passing-track switch, and as Engineman Cunningham desired to get his train off the main track, he proceeded slowly for a few car lengths, and when he saw the markers on the rear of extra 2232 only about two car lengths distant, he was unable to stop before coupling to the caboose of that train, but practically no damage resulted. Very shortly afterwards the rear of extra 2257 was struck by extra 2270.

Eastbound freight train extra 2270 consisted of 44 cars and a caboose, hauled by engine 2270, and was in charge of Conductor Lake and Engineman Gilley. This train left Cheyenne, according to the train sheet, at 10.55 p.m., and was brought to a stop at signal 4916, which was displaying a stop indication. After remaining a minute or two at this point extra 2270 proceeded, and was moving at a speed of 5 or 6 miles an hour when it collided with the rear of extra 2257.

The coach and one car of extra 2257 were considerably damaged, while only slight damage was sustained by engine 2270.

Summary of evidence - When extra 2257 stopped at signal 4916, Flagman Grant went back to flag, after which Conductor Nugent went to the head end of the train. When the train was ready to proceed, whistle signals were sounded for the purpose of recalling the flagman, while Conductor Nugent also went back to the rear of the train to see if the flagman returned, meeting the flagman a few car lengths west of the caboose. The flagman had heard a whistle signal and thought he had been recalled, and the conductor said that in response to his question the flagman said he had left torpedoes and a fusee before coming in. Conductor Nugent had arranged with the engineman that he would open a valve in the train line if the flagman had returned, and he did so, but as the train did not proceed, due to the fact the engineman found snow had clogged the intake on the air pump, Conductor Nugent told the flagman to go back what he thought was half the length of the train, put down torpedoes, and return to the caboose, while the conductor again went to the head end of the train. By the time he reached there the difficulty with the air pump had been remedied and in the meantime the flagman said he went back again in accordance with the conductor's instructions, put down torpedoes and returned to the caboose. The train then proceeded, so slowly that Flagman Grant said he became alarmed and threw off several fusees. When the train again stopped, at the time it was flagged by the flagman of extra 2232, Flagman Giant again started back, carrying a lighted fusee, he thought he had heard a whistle at a block signal in the rear of his train, and after continuing back for two or three minutes heard a train approaching. He said he put down one torpedo, turned his back to the wind to light another fusee, and as he again turned around saw the headlight. He said he threw the fusee, which was half burned into the air in order to attract the attention of the engineman, but that the wind blew it to one side, and said he then tried to board the engine

as it passed him, but thought he might miss it, and instead boarded the first car, where he rode to the point of collision. He estimated the speed of the train to have been 5 or 6 miles an hour, and expressed the opinion the one torpedo he had put down was about eight car lengths from the rear of his train.

Engineman Gilley said that after stopping about a minute at signal 4916 he proceeded at a speed which he said was as low as it was possible to keep the train moving, and the first intimation he had that he was approaching the train ahead was when he saw a fusee about one or one and one-half car lengths distant, at which time he applied the brakes in emergency. Engineman Gilley also estimated that he was about one and one-half car lengths from the caboose at this time and said he thought the weight of the train, coupled with the fact that the slack was bunched, caused it to slide into the train ahead. Fireman Carey did not know there was anything wrong until the engineman applied the air brakes in emergency and said he had not seen the reflection of any fusees, while both members of the engine crew also said they had not heard the explosion of any torpedoes. Conductor Lake and Head Brakeman Chelf had started to inspect the train when it stopped at signal 4916, and when it started ahead they boarded the side of one of the cars and rode in that position to the point of accident.

#### ACCIDENT AT BORIE

The accident at Borie was between two freight trains and resulted in the death of one employee and the injury of one employee.

Location - This accident occurred on the fifth subdivision, extending between Cheyenne and Laramie. The signals involved are of the two-position, lower quadrant type. The accident occurred 2,580 feet east of automatic home signal 5202, the distant signal 5208 is located 3,307 feet farther west. Approaching from the west there are 1,310 feet of tangent and a 1-degree curve to the left 1,397 feet in length, followed by a tangent extending beyond the point of accident, 874 feet distant. The grade is about 1.53 per cent descending to eastbound trains, for a distance of several miles. Under special timetable rule 14-B, all eastbound freight trains are required to stop at Buford, Granite Canyon, Otto, and Borie for inspection and to allow wheels to cool.

Description - Eastbound freight train extra 260 consisted of 40 cars and a caboose, hauled by engine 260, and was in charge of Conductor Souttar and Engineman Spelts. It left Laramie, according to the train sheet, at 5:40 p.m. November 4 assisted by helper engine 214, which was cut off at Buford, 17.5 miles west of Borie. Extra 260 departed from Buford, according to the train sheet, at 10:45 p.m., stopped for inspection at Granite Canyon and Otto, 96 and 49 miles, respectively, from Borie, and arrived at Borie at 12:01 a.m. While standing at this point it was struck by extra 228.

Eastbound freight train extra 228 consisted of 41 cars and a caboose, hauled by engine 228, and was in charge of Conductor Crone and Engineman Barkentine. It left Laramie, according to the train sheet, at 6:20 p.m. November 4, assisted by helper engine 227; and arrived at Buford at 10:20 p.m. Engine 227 was cut off at this point and extra 228 departed at 11:10 p.m., stopped for inspection at Granite Canyon and Otto, and collided with extra 260 at Borie while traveling at a low late of speed.

The caboose and three rear cars of extra 260 were demolished while no serious damage was caused to engine 228. The employee killed was a shop foreman riding in the caboose of extra 260.

Summary of evidence - After the inspection at Granite Canyon, Conductor Souttar, of extra 260, rode in the engine for the purpose of assisting the engineman in observing signal indications and continued to ride on the engine after leaving Otto. A stop was made at the west switch at Borie, near signal 5202, after which the train pulled ahead and stopped with the engine near the home interlocking signal, which is 4,931 feet east of signal 5202. Conductor Souttar walked back until he reached the head end of the caboos, did not see the flagman and assumed that he was back protecting the train. He then returned to the head end and went to the tower to arrange for his train to proceed as soon as possible in order to avoid being stalled in the snow, soon afterwards Conductor Crone, of extra 228, reached the tower and notified him of the accident. Flagman Cameron said he had gotten off when his train first stopped at Borie and placed a lighted fusee on the bank beside the track. He said his train pulled ahead almost immediately and after it had stopped a second time he got off and went back to the west switch, which is 2,515 feet west of the point where the accident occurred, and placed three torpedoes on the rail, close together, as a stop signal, left a lighted fusee and returned to his train. He found the markers extinguished, removed them, set them down inside of the caboos with the intention of relighting them, and was standing on the platform when he heard a whistle sounded by the engineman of extra 228 as it approached. The only reason advanced by Flagman Cameron for returning to his train was that he said it was impossible to see or hear signals and he supposed it would proceed as soon as it had been inspected, and that sufficient time for that purpose had elapsed.

Engineman Barkentine, of extra 228, knew that extra 260 was ahead of him, as he had been held at Buford by Assistant Trainmaster Murphy until 30 minutes after its departure, this additional precaution being taken in view of the existing weather conditions. Engineman Barkentine said he missed some of the distant signals, but always managed to observe the home signals. Approaching Borie he did not observe distant signal 5208, and on arriving at home signal 5202 saw the mast as the engine passed it but did not observe the indication of the signal, although he looked back in an endeavor to do so. At this time Conductor Crone, who was standing back of him, told him he had better stop. The speed was then about 15 miles an hour and he began to reduce speed for the regular stop. He did not see any fusees nor did he hear the explosion of any torpedoes, and said that his train collided with extra 260 while traveling at a speed of 6 or 7 miles an hour. Engineman Barkentine expressed the opinion that he had done just as well as he would have done if he had stopped at the home automatic signal and then proceeded at 6 miles an hour. Conductor Crone had been standing on the engineman's side en route from Otto to Borie and did not himself see any of the signals, but said the engineman was calling them as being clear. When signal 5202 was reached the engineman looked around and said something which he did not hear, but he told the engineman to stop at once, and the engineman began applying the air brakes. Conductor Crone thought the speed passing signal 5202 was about 13 miles an hour and about 6 miles an hour when this accident occurred. Fireman Winkler said he was looking ahead all of the time, but saw none of the signals, and did not know there was anything wrong until the accident occurred. Head Brakeman Lucas, riding on the fireman's side of the engine, also said he did not see any of the signals, but that some torpedoes, he did not know how many, were exploded just before the collision occurred. With the exception of the head brakeman, none of the employees on engine 228 heard any torpedoes, nor did any of them see any burning fusees

## ACCIDENT AT BUFORD

The accident at Buford was between a mail train and a freight train and resulted in the death of three employees and the injury of one employee

Location -This accident also occurred on the fifth subdivision. The point of accident was 4,580 feet west of the station at Buford, approaching this point from the west the track is tangent a distance of 2,420 feet, followed by a 1-degree curve to the left 1,478 feet in length, the accident occurring on this curve at a point 592 feet from its western end. The grade is descending eastward for a distance of several miles, being 0.79 percent at the point of accident. The automatic signals are of the two-arm, two-position, lower-quadrant type, signal 5386 is located 5,832 feet west of the point of accident, while 7,180 feet farther west, between the switches at Sherman, is signal 5398.

Description - Eastbound freight train extra 306 consisted of 49 cars and a caboose, hauled by engines 306 and 328, and was in charge of Conductor Pope and Enginemen Cotton and Lerber. It left Laramie, according to the train sheet, at 8:50 p.m. While standing at this point the rear end of the train, which was outside of the yard limits, was stuck by train first No. 6. Eastbound mail train first No. 6 consisted of 12 baggage, express and mail cars, and 1 deadhead Pullman sleeping car hauled by engines 2252 and 2872, and was in charge of Conductor Matthews and Enginemen Kennedy and Harnish. Before leaving Laramie the crew received, among others, a copy of train order No. 696 Form 19, reading as follows: Heavy fog between Laramie and Cheyenne. Run carefully approaching all stations especially in said limits.

Train first No. 6 left Laramie, according to the train sheet, at 12:40 a.m., 1 hour 30 minutes late and collided with the rear end of extra 306 at Buford while traveling at a speed estimated by the crew to have been about 20 miles an hour.

The caboose and 6 cars of extra 306 were demolished, while slight damage was sustained by 5 others. Both engines on train first No. 6 were derailed, engine 2252 turning over on its right side with the boiler clear of the track, while engine 2872 remained upright. The employees killed were the flagman of extra 306, whose body was found in the wreckage, an assistant gang foreman, who had been riding in an outfit car on the rear of extra 306, and the fireman of the leading engine of train first No. 6.

Summary of evidence - Engineman Cotton, of extra 306, said the first stop he made at Buford, after stopping at signal 5386, was in the vicinity of the yard-limit board, which is 1,216 feet east of where the accident occurred. After standing several minutes, he twice sounded the whistle signal recalling the flagman and pulled ahead to within 15 or 18 car lengths of the next block signal, which is 2,100 feet east of the yard-limit board and sounded the whistle signal for the flagman to again go back and protect the train. His train had been standing in this position for some time when the train ahead, which was extra 232, proceeded, and he then sounded the whistle signals to call in the flagman, waited about five minutes, sounded this signal a second time, and after waiting an additional minute was about to pull ahead when the accident occurred. He had received no instruction to call in the flagman, but as the train ahead had proceeded he intended on pulling down to the station and heading in on a sidetrack or else proceeding, depending on developments after he reached the station. Engineman Cotton said that he was able to observe the position of the automatic block signals by looking down and seeing the base of the signal

mast, after which he would look up and observe the indication.

According to Conductor Pope, of extra 306, when approaching Buford the train came to a stop with the rear end near the mile board, or about 500 feet west of the point of accident. Flagman Groth got off at this point and started back to flag, carrying a lighted fusee, Conductor Pope watching him until he disappeared in the storm. The train then pulled ahead a short distance and again came to a stop. Conductor Pope remained in the caboose a few minutes and then started for the head end of the train, at which time, on account of the weather conditions, he was able to see only a car length. On reaching the station, Conductor Pope said he met Assistant Trainmaster Murphy and asked that steps be taken to afford his train as much protection as possible against train first No. 6, and the assistant trainmaster called the office at Laramie, found train first No. 6 had departed, and then sent a message to that train at Hermosa Junction, 13.2 miles from Buford, to look out for the rear end of extra 306 in the vicinity of the mile board at Buford. In the meantime extra 232 proceeded and Conductor Pope was arranging to head his train in on a sidetrack when it was struck by train first No. 6.

There was no evidence to indicate when Flagman Groth, of extra 306, returned to his train. Before train first No. 6 left Laramie Conductor Matthews told both enginemen not to try to make up any time. He did not think the speed of his train approaching the point of accident was more than 20 miles an hour, although he said it was very difficult to judge the speed on account of the conditions prevailing. Engineman Kennedy, in charge of the leading engine, said the only message he received at Hermosa Junction was to the effect that there was a train on the siding at Dale Creek. After leaving Hermosa Junction he did not encounter any torpedoes and said he felt sure he would have heard them, as he was riding with his head well out the window. The last block signal he observed was at the west switch at Sherman, the indication of which was clear, and which he said meant he had a clear track as far as the next home signal, which is signal 5386. It was in this vicinity that the wind blew in a window on the left side of the cab. The next signal, located half a mile east of the west switch at Sherman, signal 5398, was not observed by him, it being at about this time that the engine struck a snowdrift, but he said it could only have indicated caution, which would not have affected the right of his train to proceed to signals 5386. He knew he had missed the indication and was looking intently for the indication of the next signal, 5386, but was unable to see any of the surrounding country to give him an idea of the location of his train, and passed the signal without seeing its indication and without knowing that he had passed it. He had made three applications of the brakes after starting down the hill at Sherman, intending to maintain a speed of about 15 miles an hour, and had encountered a clear space on a fill, here on account of there being no drifts he thought the speed increased to perhaps 20 miles per hour. As he was about to make the fourth application he saw what he thought might have been the bottom of the mile board, and then made a heavy application and about the same time felt the engine strike something, at which time he placed the brake valve in the emergency position. At no time had he seen the rear end of extra 306, although he was riding with his head out of the window, looking ahead, nor had he seen a flagman or fusees or heard torpedoes. Engineman Kennedy also stated that approaching the point of accident Fireman Colinwood was riding on the deck of the engine, as after the window was blown in on the fireman's side of the cab it had been practically impossible for him to ride on his seat box.

Engineman Harnish, in charge of engine 2872, said he had not seen all of the signal indications, but having full confidence in Engineman Kennedy did not feel there was any necessity for taking any action. He thought the speed was about 25 miles an hour at the

time of the accident.

There was a dispute concerning the sending of instructions to the operator at Hermosa Junction to give a message to the crew of train first No. 6 to watch for the rear end of extra 306 at Buford, the operators at Hermosa Junction saying the only message received related to the train on the sidetrack at Dale Creek.

While the flagman of Extra 306 apparently had returned to his train without authority to do so, as was also done by the flagman involved in the accident at Borie, attention is called to the fact that Flagman Pinard, of train first No. 6, gave his train proper protection and remained out for a period of four hours, came in, and went back a second time, remaining for an additional period of one and one-half hours, until picked up by the relief train from Laramie.

## CONCLUSIONS

The three accidents described were identical in character, differing only in attending circumstance, they occurred within a distance of less than 50 miles and within a period of two hours. During this period the storm was at its height, and the investigation disclosed that the usual practices and safeguards were inadequate under these extraordinary conditions. The statements of employees involved indicate that on account of the high wind and heavy snow, block signals could be seen only with the greatest difficulty, if at all, the view was so restricted that it was impossible to control trains within range of vision at the lowest rates of speed at which it was practicable to operate them, the signals of the one flagman who was out protecting his train were ineffective, as a fusee was not seen and torpedoes were not heard by the engine crew of the train he attempted to flag, and engine-whistle signals sending out and calling in flagmen could not be heard from required distances. Notwithstanding these conditions, the employees involved apparently did not realize the gravity of the situation sufficiently to impel them to tie up their trains, as provided in rule 101-A, or, if that was impracticable, to do all that was humanly possible to protect their trains until the storm abated sufficiently to permit them to be operated with safety. Rules 101-A, 101-B, 406, and 509-C of the Rules and Instructions of the Transportation Department reads as follows.

101-A When overtaken by severe storms all trains must proceed with caution, so that they can be stopped in time to prevent accident and if in doubt as to being able to proceed safely, place train on siding and remain there until it is safe to proceed.

101-B During foggy or stormy weather no attempt must be made to recover lost time, and trains must approach switches and signals prepared to stop unless they are in proper position.

406 In foggy or stormy weather enginemen must approach all signals with great care, prepared to respect the indication given

509-C (Applying when a train encounters a block signal in stop position). On double track, it may proceed at once at slow speed, not exceeding 6 miles an hour, expecting to find a train in the block, broken rail, obstruction, or switch not properly set.

In view of the difficulty of observing signals, Engineman Kennedy, of train first No. 6, was operating his train at an unsafe rate of speed as it approached Buford. This train exceeded schedule speed, covering the distance from Laramie to the point of accident at an average rate of 37 miles an hour or in about 48 minutes, whereas the schedule provides 1 hour and 1 minute from Laramie to Buford. Approaching the point of accident, Engineman Kennedy failed to observe either the distant or the home signal indications, and while he was lost at the time of the accident it is believed that had he been fully attentive to his duty he should

have been able to locate himself when his train rounded the long 4-degree curve immediately beyond the home signal in any event, he should have been operating his train at a rate of speed sufficiently reduced to permit him to locate signals and observe their indications.

Engineman Barkentine, of extra 228, when approaching Borie missed the distant signal and should have taken particular care to so operate his train as to stop at the home signal, yet, according to his own estimate, his train passed that signal at a speed of 15 miles an hour, without his having observed its indication.

At Hillsdale the flagman went back to protect his train but, according to his statement, was unable to attract the attention of the engine crew with his warning signals even though the rate of speed was sufficiently low to enable him to board the train. At Buford nothing is known as to when or why the flagman returned to his train. At Borie the flagman went back, put down torpedoes and a fusee, and returned immediately, thinking his train would be ready to depart. That it was possible for a flagman to go out in the storm for the purpose of protecting his train as required by the rules is apparent from the fact that after the accident at Buford the flagman of train first No. 6 was out flagging for a period of several hours, and the Weather Bureau reports show that the temperature was only slightly below freezing. At Buford the rules as to flagging and signal observance were not properly observed, the flagman returned to his train without being recalled, and the engineman did not observe the block signals. In the Hillsdale accident it appears that the rules as to flagging and signal observance were reasonably well observed, the flagman was out and endeavored to stop the following train, and the engineman of the following train observed the stop indication of the automatic signal and then proceeded at low speed. In each of these instances a rear-end collision resulted, although the Buford accident was more disastrous on account of the higher rate of speed of the mail train. Under such conditions had an automatic train-control device been used, train first No. 6 would have been stopped and the engineman then would have been able to locate himself, and the accident might have been prevented or at least the severity of the collision reduced.

Under the conditions existing on the night of these accidents, with some trains stalled in the snow and others being operated at low rates of speed, it was entirely ineffective to establish a time interval between trains at certain points. Had a system of absolute blocking of trains been in effect during the continuance of this storm, either between stations or by requiring the block signals to be observed as stop and stay signals, a greater degree of safety would have been provided. The investigation of these accidents and consideration of the surrounding circumstances leads very clearly to the conclusion that there are times when weather conditions are such that, without an absolute block, trains can not be operated with safety and temporary suspension of operation is the only alternative means of preventing collisions.