

## INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE  
INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE  
ATCHISON, TOPEKA & SANTA FE RAILWAY NEAR FLAGSTAFF,  
ARIZ., ON MAY 23, 1927.

June 20, 1927.

To the Commission:

On May 23, 1927, there was a rear-end collision between two passenger trains on the Atchison, Topeka & Santa Fe Railway near Flagstaff, Arizona, which resulted in the death of 2 passengers and the injury of 128 passengers and 37 employees. The investigation of this accident was made in conjunction with representatives of the Corporation Commission of Arizona.

Location and method of operation

This accident occurred on the third district of the Albuquerque Division, a double-track line extending between Seligman and Winslow, Arizona, a distance of 143.4 miles. Trains moving with the current of traffic in the vicinity of the point of accident keep to the left and they are operated by time-table, train orders and an automatic block signal system. The signals are of the three-position upper-quadrant type mounted on signal bridges which span the two tracks. The signals directly involved were signals 3492 and 3462, located about 3 miles and 150 feet, respectively, west of where the accident occurred.

The point of accident was about 2 miles west of Flagstaff; approaching this point from the west the track is a succession of curves and tangents followed by a 4° curve to the left 1,274 feet in length, 656 feet of tangent and then a 5° curve to the right, the accident occurring at the beginning of the last-mentioned curve. The grade is 1.42 per cent descending for eastbound trains. The fireman of an eastbound train can see signal 3462 a distance of 980 feet, while the engineman can see it a distance of 755 feet. The rear end of a train standing at the point of accident can be seen by the fireman of a following train a distance of 1,106 feet and by the engineman a distance of 903 feet.

The weather was clear at the time of the accident, which occurred at about 7.08 a.m.

### Description

On the day of the accident there were seven sections of eastbound train No. 4, known as the California Limited, and the accident occurred between the first two sections of this train. Train first No. 4 consisted of one baggage car, one dining car, one lounge car, eight Pullman sleeping cars and one observation car, all of steel construction, hauled by engine 3742, and was in charge of Conductor Keeney and Engineman Hays. It left Williams, Arizona, the last open office, located about 32 miles west of the point of accident, at 6.08 a.m., 28 minutes late, and was in the vicinity of signal 3462 when the air brakes applied in emergency, bringing the train to a stop with its rear end approximately 150 feet east of signal 3462. It had been standing at this point for a period of about six or seven minutes when it was struck by train second No. 4.

Eastbound train second No. 4 consisted of one buffet car, one dining car and seven Pullman sleeping cars, all of steel construction, hauled by engine 3743, and was in charge of Conductor Smith and Engineman Simmons. It left Williams at 6.21 a.m., 41 minutes late on the schedule of train No. 4, passed signals 3492 and 3462 in the caution and stop positions, respectively, and collided with train first No. 4 while traveling at a speed variously estimated by the crew to have been between 8 and 30 miles per hour.

At the time of the impact train first No. 4 was standing with the brakes released on the cars in the train and the independent brake applied on the engine. The entire train was driven ahead a distance of 40 or 50 feet while the engine broke away from the first car. The last two cars in the train were derailed, the observation car being telescoped a distance of about 12 feet, while six other cars in this train sustained damage. Engine 3743, of train second No. 4 had only its truck derailed; it was considerably damaged, however, while practically all of the cars in this train received more or less minor damage.

### Summary of Evidence

Engineman Hays, of train first No. 4, said the speed of his train was about 40 miles per hour when the air brakes applied in emergency and he at once lapped the brake valve and allowed the train to come to a stop at which time it was about 7.00 or 7.01 a.m. He placed the

brake valve in the full release position and then moved it back to the running position and as the train line immediately began to recharge he reached the conclusion that some one of the passengers had opened a conductor's valve in one of the cars. In the meantime the conductor and brakeman had gotten off and started back toward the rear of the train, the brakeman finally stopping about opposite the middle of the train so that he could transmit signals to the engineman while the conductor continued toward the rear end of the train, which was then out of sight of the engineman. Being of the opinion that there was nothing wrong with the train line Engineman Hays supposed he would be able to proceed with practically no delay and therefore did not sound the whistle signal for the flagman to protect the train, and about two minutes afterwards, in response to a signal given by the head brakeman, he sounded the whistle <sup>signal</sup> recalling the flagman. He did not, however, receive a signal to proceed and he estimated that about four minutes elapsed between the time at which he recalled the flagman and the time at which the accident occurred. Engineman Hays further stated that the air brakes had been tested at Scligman and again at Williams, where some cars had been picked up, and that he also had made a running test when departing from each of these stations. None of these tests revealed the presence of anything wrong with the air-brake system, nor was any difficulty experienced when making the various air-brake applications en route to the point where the brakes applied in emergency. After the accident he pulled nine of the cars in his train as far as Winslow and experienced no difficulty with the operation of the air-brake system. The statements of Fireman Moden brought out nothing additional of importance except that after his train had stopped he crossed over to the engineman's side, looked out of the gangway and finally saw a signal given to recall the flagman.

Head Brakeman Slater, of train first No. 4, said he was riding in the third car of the train with Conductor Keeney and that as soon as the train came to a stop he got off on the engineman's side of the train, followed by the conductor, and started toward the rear end. After proceeding three or four car-lengths, the brakes began to release and he was told by the conductor to remain at that point while the conductor continued back to the rear of the train to see if everything was all right. Head Brakeman Slater said that when the conductor reached the rear of the train the conductor gave him a signal to recall the flagman and he at once transmitted this signal to the engineman. His other statements developed no facts of importance.

Conductor Keeney, of train first No. 4, said that after telling Head Brakeman Slater to remain at the point where the head brakeman was to transmit the signals to the

engineman he proceeded to the rear of the train and on reaching that point saw Flagman Palmer going back to flag, the flagman then being at about the point of the curve or about 850 feet from the rear of the train. Having found nothing wrong with the air-brake system Conductor Keeney then gave Head Brakeman Slater a signal to indicate that there was nothing wrong, his intention being to inform the engineman that if there was difficulty at any point on the train it was located on the engine and not on the cars. This signal which he gave the head brakeman was what is termed a "high ball" or proceed signal. The head brakeman then transmitted this signal to the engineman who in turn sounded the whistle signal recalling the flagman, and Conductor Keeney then assumed that the engine was also in condition to proceed. When the recall whistle signal was sounded the flagman stooped and apparently put down torpedoes and then started to run toward the train. Conductor Keeney said that after running a short distance the flagman stopped and put down another torpedo and again began to run toward the train. Presently the second section of train No. 4 appeared in sight around the curve and exploded the two torpedoes which had first been put down by the flagman and at the sound of the torpedoes the flagman turned and started toward the approaching train waving a red flag. Conductor Keeney realized that an accident was about to occur and called to the people in the observation car to get off as quickly as possible. After this had been done he also started to run toward the approaching train giving stop signals but had only reached a point about 150 feet from the rear of his own train when the engine of the following train passed him. He estimated the speed of train second No. 4 to have been about 50 miles per hour when it first came in sight and about 30 miles per hour when it passed him. Conductor Keeney further stated that he considered it proper for the flagman to return to the train under the circumstances as they existed at that time saying that when his train left Winslow the second section was not in sight and that his train had stopped with its rear end on straight track with a block signal displaying a stop indication a short distance back of the rear of the train. Conductor Keeney's statements as to the testing of the brakes agreed with those of Engineman Hays and he also said that he did not succeed in ascertaining the reason for the emergency application which brought his train to a stop. Conductor Keeney placed the time at which his train stopped at 7.02 a.m. and the time at which the accident occurred at 7.08 a.m.

Flagman Palmer, of train first No. 4, said he was riding in the observation end of the rear car when he felt the air brakes apply in emergency and that he at once started for his flagging equipment, got off and went back to flag,

running part of the time and walking part of the time. The whistle signal recalling him was sounded when he had reached a point which he afterwards found was twenty-five 39-foot rail-lengths from signal 3462; he said that when this signal was sounded he stopped and put down two torpedoes and then began to run toward his train and he estimated that he was within 300 or 400 feet of his train when he heard the rumble of the following section. He then turned around and started toward the approaching train giving stop signals and said that to the best of his recollection the stop signals were acknowledged. He was unable to go back but a short additional distance however before the engine passed him, moving at a speed he estimated to have been about 25 miles per hour.

In one of the paragraphs in rule 99 of the rules and regulations of the operating department of this railway there is a provision that when a flagman is recalled before reaching the required distance, which is one-half mile or more, depending on conditions, he must before returning to his train put down two torpedoes 60 feet apart "a sufficient distance from his own train to protect it while he is returning." In a subsequent paragraph it is further provided that a flagman must "always bear in mind that the time of return to his train is a time of great risk" and that should he see or hear an approaching train he must remain and do everything possible to stop it in time to avoid an accident. Flagman Palmer said he had not seen or heard anything of the second section before he started to return to his train and that he thought he had provided sufficient protection to enable him to return, although in a later statement he said he considered the distance sufficient if the approaching train were running with caution and that he thought he had a right to expect some protection from the signal. Flagman Palmer, who first began to work on this division in 1924, said he had never previously worked in automatic block-signal territory, that he was not required to fill out a book on the rules and that the only examination given him was an oral examination by a chief clerk which did not cover the flagging or block-signal rules.

Engineman Simmons, of train second No. 4, said that no change was made in the consist of his train between Seligman and the point of accident, that the air brakes on his train were tested before its departure from Seligman; that a running test was made when leaving that point; and that the brakes had operated properly when making various

stops en route and when used for the purpose of reducing speed on the various grades. After leaving Williams, at which point he had been informed that the first section was a few minutes ahead of his own train, he found all the automatic block signals in the clear position until his train reached Manistee, 11.6 miles east of Williams; beginning at this point, the next two signals were displaying caution indications, the next signal changed from caution to proceed as his train approached it and the three succeeding signals were in the caution position, the last one of these being signal 3492 which he passed at a speed he estimated to have been about 25 or 30 miles per hour. Engineman Simmons said he made a 12-pound brake-pipe reduction as his train rounded the curve to the left approaching signal 3462, moving at a speed which was then about 30 miles per hour and as the train neared the end of the curve the firemen called "red board." Engineman Simmons said he then made an additional brake-pipe reduction; at about that time the engine exploded two torpedoes and on reaching the tangent track he saw the stop indication of signal 3462, the rear end of the preceding section, and the flagman, and he at once moved the brake valve handle to the emergency position and opened the sanders and he said he thought he had reduced the speed to about 8 miles per hour by the time the accident occurred. Engineman Simmons said it appeared to him that the flagman was standing at the rear end of the first section and that he did not give any stop signals with his flag until the second section was within 30 or 40 feet of signal 3462. Engineman Simmons' understanding of the action required by him on finding a signal displaying a caution indication was that the speed should be reduced and that the train should proceed through the block moving cautiously around curves where the view might be obscured. He did not recall that the rule required him to proceed under control, which in turn is defined in the rule book as being prepared to stop within the distance the track is seen to be clear. Until he tried to bring his train to a stop he had been of the opinion that his train was under proper control and he was unable to offer any explanation for his failure to stop, although at a later point in his testimony he said that if he had been properly flagged the accident would not have occurred. Engineman Simmons further stated that he was examined on the rules in 1913 and that he had read them since that time and also on one or two occasions had consulted with supervisory officials concerning the rules. Engineman Simmons had been off duty from the evening of May 20 until he went on duty at Winslow at 7 p.m. May 22. He said he slept during the night of May 21 and also took a short nap dur-

if he had received caution indications. He further stated that he had talked with Engineman Simmons at Seligman and again at Williams and on each of these occasions the engineman appeared to be in normal physical condition.

Head Brakeman Lutz, of train second No. 4, who was riding in the baggage end of the buffet car, said the air brakes had been used at various times to steady the train on the descending grade and that his first knowledge of anything wrong was when he heard torpedoes exploded. He then opened one of the side doors of the baggage compartment, looked out, saw the rear end of the first section, and stepped back into the car and called a warning to the others just as the accident occurred. While Head Brakeman Lutz said that an emergency application of the air brakes was made after the torpedoes were exploded his other statements made it appear somewhat doubtful as to whether this was actually the case. He estimated the speed of his train to have been about 25 or 30 miles per hour at the time he looked out of the door of the baggage compartment.

Flagman Young said he had felt an application of the air brakes made either as the train was rounding the curve or after it had reached the tangent track, but that he did not notice any emergency application and that his first knowledge of anything wrong was when the accident occurred, throwing him the length of the observation end of the car. He estimated the speed of his train when rounding the curve to have been about 35 miles per hour.

The engines on both of these sections of train No. 4 had not been changed on their arrival at Seligman from the west. At that point, however, the engines were inspected while the air-brake system of each train was tested, nothing being found which could have had any bearing on the occurrence of this accident or to explain the reason for the emergency application which stopped the first section at the point where the accident occurred.

#### Conclusions

This accident was caused by the failure of Engineman Simmons, of train second No. 4, properly to obey signal indications.

According to the statements of Engineman Simmons he had passed two signals displaying caution indications, one signal which changed from caution to proceed before his engine reached it, and then he had passed three more caution signal indications before encountering the stop indication of signal 3462. These various caution indications indicated clearly enough that he had closed up on the preceding train and had he obeyed the requirements of the rules which govern a situation of this kind the accident would not have occurred. These requirements, according to rule 27 of the special rules in the time-table, are that when a signal is in the 45° position the train governed thereby is to "proceed under control". It is also provided in rule 743 of the rules and regulations of the operating department that when a caution signal is received a train may proceed under control, while the rule book, as previously stated, defines "under control" as the ability to stop a train within the distance the track is seen to be clear.

One of the features developed by this investigation, that is, trains following each other so closely as to result in receiving caution indications at successive signal locations, has been discussed on previous occasions. More than 10 years ago, to be exact, in the report covering the investigation of the accident which occurred on the New York, New Haven & Hartford Railroad near Milford, Conn., on February 23, 1916, this matter was gone into somewhat in detail and it might be well to quote a statement made at that time which applies to the present case and to all others where enginemen in fast passenger-train service indulge either customarily or occasionally in the dangerous practice of "running on the yellow". This statement is as follows:

\*\*\*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."



Under the requirements of rule 99 previously referred to in this report Flagman Palmer, when recalled before he had gone back the distance prescribed by the rules, was required to put down torpedoes a sufficient distance from his train to protect it while returning to the train. As usually interpreted a rule of this character implies that if a following train can not be seen or heard then the flagman may put down torpedoes and return, which was the situation in this case. This action by Flagman Palmer was taken in the full view of the conductor, who was standing at the rear of his train, and it is not believed that either the conductor or the flagman can be considered responsible for the occurrence of the accident.

There is a further requirement in rule 99 that when a flagman is recalled and there is not a clear view in the rear of the train for a distance of at least one-fourth of a mile, the train must be moved ahead at a speed of at least 6 miles per hour until it reaches a point where the track is straight for at least the distance prescribed, the flagman not to be recalled until the train is in motion. Literal compliance with this rule would have required train first No. 4 to have been moved ahead a distance of more than 9,000 feet. As it was, the train was standing on the curve to the right with the rear end of the train at the end of a short section of tangent track, resulting in the rear end of the train being visible as far as was practicable under the existing conditions.

The investigation did not develop what caused the emergency application of the air brakes on train first No. 4. They had been tested at Seligman and also at Williams and had worked properly in controlling the speed of the train at all points. The suggestion was advanced that some one of the passengers had opened a conductor's valve either by accident or otherwise, but no proof was produced to support this suggestion.

It is to be noted that neither engineman had been examined on the book of rules within the past 14 years and apparently the flagman of the first section never had been given such an examination, this flagman seemed to be reasonably familiar with the rules governing his duties but Engineman Simmons did not appear to have a very definite idea of what the rules prescribed should be done when running under a caution signal indication. There is little

excuse for failure to examine employees sufficiently often to insure that they are thoroughly acquainted with the rules under which they must operate, and steps to correct such a situation should be taken immediately.

Had an adequate system of automatic train control been in use, this accident would not have occurred.

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

Respectfully submitted,

W. P. BORLAND,

Director.