INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE NORTHERN PACIFIC RAILWAY NEAR LOOKOUT, MONTANA, ON JANUARY 16, 1930.

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March 7, 1930.

To the Commission:

On January 16, 1930, there was a derailment of a freight train on the Northern Pacific Railway near Lookout, Mont., resulting in the death of two employees and the injury of one employee. This accident was investigated jointly with the Montana State Railroad Commission.

## Location and method of operation

This accident occurred on the Eighth Subdivision of the Rocky Mountain Division, extending between St. Regis, Mont., and Wallace, Idaho, a distance of 56.9 miles. It is a single-track line over which trains are operated by time table and train orders, no block signal system being in use. The accident occurred at a point about 6,300 feet east of the east switch of the north passing track at Lookout. Approaching the point of accident from this switch and proceeding in an eastwardly direction there are 473.7 feet of tangent, then a 5° curve to the right 352 feet long, 897.3 feet of tangent, a 5° curve to the left 326 feet long, 1,051.5 feet of tangent, a 16° curve to the right 578.5 feet long, 1,137.4 feet of tangent, a 2° curve to the left 350 feet long, 534 feet of tangent, and a 16° curve to the left 1,046.5 feet long. The derailment occurred on this latter curve about 592 feet from its western end.

Between Lookout and the point of accident the track is laid on a descending grade for eastbound trains, varying from 3.2 per cent to 4 per cent, the major portion of which is 4 per cent; at the point of derailment the grade is 3.35 per cent. The track consists of 90-pound steel rails, 33 feet in length, tie-plated and well spiked on curves and further secured with rail anchors. There are about 12 inches of pit-run ballast under the ties, the track is well maintained with uniform gauge, and superelevation at point of derailment is four inches, at which point the track is laid on a fill about 15 feet in height.

The weather at the time was clear and the temperature about 10 degrees below zero, with a strong east wind blowing. The accident occurred at about 1.55 p.m.

## Description

Eastbound train No. 842 left Wallace, its initial terminal, at 7.10 a.m. with 14 loads, 1 empty and caboose, hauled by locomotive 3015 with locomotive 3001 as helper, and was in charge of Conductor Eddins and Engineman Campbell. Upon arriving at Morning, 6 miles distant, 9 loads were picked up, and upon leaving Dorsey, 15.1 miles from Wallace, it was necessary to double the train into Lookout, a distance of 3.7 miles. At Lookout the two sections of the train were coupled together and the helper was cut off. The train then consisted of locomotive 3015, 23 loads, 1 empty and caboose, with a total of 1,531 tons. It left there at about 1.50 p.m., 7 hours and 42 minutes late, and the locomotive, tender and two head cars were derailed at a point about 1 1/5 miles east of there at about 1.55 p.m., while running at a speed estimated to have been from 35 to 40 miles an hour. The caboose was uncoupled from the train by the conductor and brought to a stop a short distance east of the point of derailment, while the remaining 22 cars continued down the grade and came to a stop at Borax, about 3.5 miles distant. The engineman and head brakeman were killed and the fireman injured.

The locomotive came to rest upside down on the right hand side of the track, headed in an eastwardly direction, with the head end 24 feet and the rear end 50 feet from the right hand rail; the tender was lying on its right hand side against the engine cab and at right angles with the locomotive, the head car was on its right side about parallel with the track with its head end against the tender, and the second car was lying against the bottom of rear of tender. No other part of the train was damaged.

There were no marks on the rails or ties to indicate the first point of derailment, the only indication being a groove in the snow and ice on the right hand bank of the fill.

Locomotive 3015 was of the mallet compound type, with a total weight, with loaded tender, of 507,700 pounds, and was equipped with three main reservoirs having a total capacity of 66,936 cubic inches.

Summary of evidence

Conductor Eddins stated that when they picked up the nine cars at Morning a car-to-car air brake test was made, and upon reaching Lookout with the two portions of the train he made the coupling, making sure that a good coupling had been made, gave the rear brakeman a signal to cut the helper off, and then cut in the air on the rear portion of the train. He then started walking back toward the rear of the train, looking at the cars, but on account of the deep snow beside the track and the construction of some of the cars he could not see under all of them. He gave the engineman a signal to apply the air brakes and continued walking toward the rear of the train, and when the rear brakeman gave him a signal from the caboose he signaled the engineman to release the brakes when he was about three car lengths from the caboose. The train started and he got on the caboose as it came up to him, and by the time he got located he said the train was going "pretty fast". He asked the rear brakeman what the air pressure was and was informed that it was 90 pounds, and when he got up in the cupola he noticed that the pressure was down to 30 pounds. At this time the train had attained considerable speed and he opened the conductor's valve at about the time the locomotive turned over.

He stated that before arriving at Lookout he made out the mountain air card showing the condition of the air brakes, tonnage of train, etc., at Lookout he took it to the head end for the engineman to sign and the latter asked him to sign it for him on account of his hands being dirty and cold. The conductor signed it in the presence of the engineman and advised him that he had 62 tons to the brake. He stated that he made a car-to-car inspection of the air brakes at Lookout as nearly as he could on each portion of the train but did not make such an inspection on the whole train after it had been coupled together, for the reason that when the train is coupled together a number of cars are extending over on the down grade where the snow is piled high on both sides of the track, making such inspection impossible. So far as he knew no such inspection is ever made on the whole train, although such an inspection is required by the rules. He stated that he did not think the accident was caused by any failure of braking power but rather by the train attaining too great a speed before the air brakes were applied. He estimated the speed at the time of derailment at 55 miles an hour. He stated that leaving Lookout the train traveled for a distance of ten or fifteen car lengths before the first application of the air brakes, the speed of the train at that time being about 15 miles an hour.

Rear Brakeman Warwick testified that the brakes were tested before the train left Wallace and when the nine cars were picked up at Morning they were again tested; upon reaching Lookout with the two portions of the train and before leaving there the brakes were again tested. He said he looked at the gauge in the caboose, saw that it registered 90 or 95 pounds pressure, gave the signal to apply the air, the brakes applied on the caboose and the car ahead and when he gave the release signal the train departed and had proceeded approximately ten car lengths when he noticed by the air gauge that a 30-pound reduction had been made. Conductor Eddins then remarked to him "I believe we are going to run away." When the train had proceeded about 500 yards further he got down from the cupola of the caboose and noticed the hand on the air gauge go from 60 to 40 and then go down slowly, 3 to 5 pounds at a time but the speed kept increasing. At that time the conductor pulled the air cord and Brakeman Warwick ran to the rear of the caboose to get a brake club and looking ahead saw the box cars and the tank going down the embankment. Conductor Eddins then uncoupled the caboose from the train and Brakeman Warwick set the hand brake, assisted by the conductor. The caboose was brought to a stop beyond the scene of the accident and both the conductor and brakeman ran back to the derailed locomotive and cars. Brakeman Warwick said he did not make an inspection of the individual brakes during the air brake test at Lookout, as he was on the rear end of the train, but stated that the conductor did make a car-to-car inspection on the front portion of the train and then the brakes on the rear portion of the train were tested.

Fireman Swant thought about 5 minutes elapsed after the air brake test before they started down the hill from Lookout; he stated that the engineman made an air brake application but the brakes did not seem to take hold and the farther they went the faster the train ran; the engineman then made what he termed "a small emergency" application of the brakes, by moving the brake valve to emergency position and then placing it in lap position, and shortly thereafter they were derailed. He stated that the speed of the train at the time of derailment might have been 40 miles an hour. He said that the engineman was in full view at all times and he did not say anything about the condition of the brakes or the speed, nor did he call for hand brakes.

Engineman McKay, in charge of the helper assisting train 842 to Lookout, stated that when the train was coupled together at Lookout the engineman was signaled to set the air brakes and after they applied the rear brakeman, from the caboose, gave the signal to release the brakes. He thought about 3 minutes elapsed after the sig-

nal to release was given before the train started and while the time was short he thought there had been sufficient time to recharge the brake pipe. He observed the conductor walking back from where he had made the coupling, and before he had reached the rear end the train had started. He stated that at Lookout it is not the practice to make a car-to-car check of the brakes and he did not think anyone looked at the pistons except possibly the last one. From his experience as an engineman he did not think a train on this grade should be allowed to attain a speed of more than 15 miles per hour.

Conductor Drury stated that after the accident he was instructed to proceed to Borax with a crew and bring in 22 cars from train No. 842; after his locomotive was coupled to the cars and the train line charged he made a test of the brakes and found that the brake on one of the cars would not operate. He stated that he found the retainers turned up on all cars and did not find any angle cocks closed, nor any bad leaks. He arrived there about three hours after the accident.

Master Mechanic Grobenour stated that he assisted in making an air brake test of the 22 cars of train 842 on the day following the accident. After charging the brake pipe pressure to 90 pounds a service application of 30 pounds was made and inspection revealed that the brakes on two of the cars would not apply. Upon making another reduction of 35 pounds the brakes on one of the two cars applied. He also measured the piston travel and found that it was from 7 to 9¼ inches.

Trainmaster Smith stated that from time to time he had observed air brake tests at Lookout and on those occasions the rules had been strictly complied with. He stated that he had been a conductor on this division and in his opinion there were no conditions at Lookout to prevent the rules governing air brake inspections being complied with.

Car Inspector Davis stated that he made the usual air brake test on the train at Wallace before it departed and found the piston travel properly adjusted and all air brakes in good condition. Other employees at Wallace testified that locomotive 3015 was in good condition when it left that point, having been inspected, repaired and handled by them the evening previous and on the morning of the accident.

## Conclusions

This accident was caused by the failure of Engineman Campbell properly to control the speed of his train on a 4 per cent descending grade.

The testimony concerning the handling of the air brake by Engineman Campbell indicated that he made a heavy service application, then went to emergency position for a moment, and then returned to lap position but did not make a full emergency application. That there is a possibility that Engineman Campbell did not have a full brake pipe pressure of 90 pounds at the time the train departed from Lookout is evidenced in the testimony of Engineman McKay and Conductor Eddins. However, according to the statement of Brakeman Warwick he observed the gage in the caboose before the test at Lookout and it showed 90 or 95 pounds and before the first reduction after starting from Lookout the gage showed the same pressure. A subsequent inspection of the caboose gage showed that it registered 5 pounds light.

That there were contributing factors beyond the control of the enginemen seems probable. The fact that the terminal and other air brake tests were made in a manner not strictly according to instructions may have had something to do with his inability to control the train. The practice followed in making departing tests at Lookout leaves a possibility of there being a closed angle cock or other obstruction in the train line but in the present instance there is nothing in the testimony to support that theory. There is also the fact that the train wheels and brake shoes were cold and possibly covered, or partly covered, with snow and ice which would increase the difficulty of getting proper braking power on the initial brake pipe reduction.

After the accident an inspection was made by the commission's inspectors of the train involved, with the exception of the caboose, and some air brake tests were also made. With a 90-pound train line, a 20-pound service application was made and the fourth brake and the sixteenth brake failed to apply. Following this first service application there were several heavy applications made for the purpose of loosening up the brake pistons, and then a full emergency application was made. On this emergency application the fourth brake applied and immediately released; the sixteenth brake remained inoperative at all times. On January 24 these cars were again tested at Missoula, the cars were arranged in the same order as when in the train at Lookout and a 30-pound service application was made from a 90-pound train line pressure with the result that the fourth and sixteenth brakes were again found to be inoperative; then a 26-pound service reduction was made with the same result, an emergency application was then made at which time both of these brakes applied; the fourth brake remained set for two minutes but the sixteenth brake released immediately; following this a 26 pound service reduction was made at which time the fourth brake applied and remained set for three minutes. Examination re-

vealed that the packing leathers were defective. These tests indicate the probability that both of these cars had defective brakes at the time they were first moved in the train, the first from Wallace, and the other from Morning, and that both were inoperative when train departed from Lookout. If this is true then the number of tons per operative brake was raised from the estimated 61 tons to 66½ tons. Piston travel measured at Missoula was from 7 to 9¼ inches with the exception of one car which showed a travel of ten inches. Retainer tests on January 20th showed one retainer leaking off in 2 minutes and the rest holding from 3 to 8 minutes. There is nothing in the testimony to show that the brakes were ever released while the train was in motion down the grade so that the condition of the retainers does not enter into this materially.

Proper inspection of the brakes at Wallace and at Morning should have disclosed the condition of the two brakes which were later found to be inoperative. The brakes on the train were not tested on the train as a unit at any time. The car inspector at Wallace did not know the brake pipe pressure at time of test or the amount of brake pipe leakage and did not count the brakes or inform the engineman on the lead engine as to the number of brakes or number of operative brakes as required by rule. At Lookout Conductor Addins did not inspect the train as a unit. He said that he inspected the head portion as it stood on the main line in front of the depot. He inspected the rear portion after it had been coupled to the head portion. His handling of the air brake cord at that point evidences a disregard for the rules governing that part of his duties. Had he been governed by an earnest desire to comply with all the rules fully he could have found a way to have his train in a position which would have enabled him to make a thorough car-to-car inspection of the air brakes at Lookout and to have assured himself that all were properly operative. He could also have taken some steps that would have enabled the engineman to have warmed up the brake shoes and wheels to some extent and thus more nearly assured the safe handling of the train down what he knew, from many years experience as a conductor in that district, to be a dangerous hill.

That the cold condition of the wheels and brake shoes on the train had something to do with the inability of the engineman to gain control of and properly brake the train before it gained too much headway is borne out to some extent by the fact that the cars of the train came to a stop on a grade of more than 2 per cent after they had passed the derailed portion of the head end by the action of the air brakes after they had been set and the shoes and wheels warmed while traveling a distance of about 3½ miles.

General instructions which were applicable in this instance provide in part as follows:

> "Before commencing descent of mountain grades, engineers and conductors are made responsible, by rules covering 'operation on mountain grades' and 'air brakes,' for thoroughly ascertaining condition of brakes and train, and determining the method that will be followed controlling the descent. They will not start until the required precautions have been fully observed, it is positively known that train can be safely handled and mutually understand and agree on the manner in which this is to be accomplished.
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> "Immediately after starting, engineers will apply air, ascertaining at once while speed is slow, as to the holding power of brakes, and will thereafter keep the speed well within the limit thus ascertained and such that train is at all times under full control, accomplishing this by frequent applications and full recharges. Speed must, in no instance, exceed that at which train can be quickly brought to a full stop, and never shall be greater than twenty (20) miles per hour."

A card is also provided on which the conductor is required to fill in information as to the number of cars in the train, the condition of the brakes on the cars, and number of tons per good brake; the engineman is required to show the condition of air appliances on the engine, both are required to sign it personally, and after conference with one another to show what if any extra precautions are required for the proper control of the train. A card of this kind is required to be completed at Lookout and delivered to the operator. The statement of Engineman McKay of helper engine 3001 and the manner in which it was carried out in this instance indicate that the brake test at Lookout is considered a matter of form only, and that the test is not made in the thorough manner provided for by the instructions. To prevent recurrence of accidents of this character action should be promptly taken by responsible officers of this company to insure that the intended safeguards for operation of trains on heavy grades are fully utilized in daily practice.

All of the employees involved were experienced men and none had been on duty in violation of the hours of service law.

Respectfully submitted,

W. P. BORLAND,

Director.