

February 4, 1913.

In re investigation of accident on the Baltimore & Ohio Railroad, near Glencoe, Pa., on December 12, 1912.

On December 12, 1912, there was a derailment of a freight train on Sand Patch grade, near Glencoe, Pa., on the Baltimore & Ohio Railroad, resulting in the death of four employees and one trespasser and the injury of five employees.

After investigation I beg to submit the following report:

The derailed train was eastbound freight extra 2541, consisting at the time of the accident of two engines, 42 loaded cars and a caboose. The derailment occurred at about 6:24 a.m., at a point about half a mile west of Glencoe, on the Conneltsville Division of the Baltimore & Ohio Railroad.

The Sand Patch grade, on which this accident occurred, is about 20 miles long, the gradient varying from .8 per cent to 1.98 per cent. Leaving the top of the hill just east of Sand Patch station the track passes through a tunnel about a mile long; the grade for a distance of about  $7\frac{1}{2}$  miles averages about 1.6 per cent, and there are numerous curves in this section of track. Then there is a tangent about  $1\frac{1}{2}$  miles long, with a descending grade of about 1 per cent; following this tangent is a curve of 8 degrees, leading toward the north and extending about 2,000 feet. On this curve the maximum super-elevation of the outside rail is 8 inches. The derailment occurred at about the middle of this curve.

There are three main tracks here, one being used for eastbound and two for westbound trains, the manual block signal system being used to govern the movement of trains. The track is laid with 33-foot rails, weighing 90 pounds to the yard. There are 18 oak ties to the rail; on curves tie plates are used and the rails are double spiked on the outside and single spiked on the inside. The ballast is crushed stone, 16 inches deep. The rails on the curve had been laid in 1909 and 1910, and it was estimated that 8 or 10 per cent of the ball had been worn away.

Extra 2541 east, with Conductor Ringler and Engineman Martz in charge, left Rockwood, Pa., at 1:10 a.m., with 20 cars and two helper engines were coupled on the rear end. This train arrived at Salisbury Junction at 2:05 a.m., and from there, on account of some misunderstanding, the two helping engines returned to Garrett, a distance of about  $3\frac{1}{2}$  miles, and picked up 28 cars. After returning to Salisbury Junction the two parts of the train were coupled together and helping engine No. 2354, with Engineman Kimmel and Fireman Gardner in charge, was coupled on the head end of the train. Extra 2541 departed from Salisbury Junction at 4:37 a.m., and arrived at Sand Patch at 5:39 a.m.

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At Sand Patch the train was brought to a stop by a service application of the brakes, for which a 25-pound reduction of the train line pressure was made, and both of the leading engines were cut off for the purpose of taking water. It had been the understanding that helping engine 2354 would be coupled on to the rear end of the train at Sand Patch, but after cutting off for the purpose of taking water and after making some repairs to his tank house Engineer Kimmel was notified by Conductor Ringler that his engine would remain on the head end of the train until it had passed through the tunnel. Conductor Ringler directed Engineer Kimmel to stop clear of the switch on the east side of the tunnel, cut his engine off there and go in on the westbound track to allow the train to pass. Engineer Kimmel stated that after the engine had been coupled on to the train, the air was cut in and the pumps started working; he and the fireman watched the air gauge as the pressure was pumped up. No brake application was made, however, nor any test to determine the condition of the train line.

Extra 2541 departed from Sand Patch at 6:09 a.m., with the understanding between the enginemen that the brakes would be controlled and operated from the leading engine. The helping engine on the rear cut off at the top of the hill just at the western portal and the train entered the tunnel. When about 50 car lengths from the eastern portal of the tunnel Engineer Kimmel made a ten-pound reduction of the train line pressure. This service application of the brakes took effect on his engine only, and he then made another ten-pound reduction. As this had no further effect, he immediately made an emergency application of the brakes, but without effect. By this time the train was emerging from the tunnel and running at a speed of from 12 to 13 miles an hour. Engineer Kimmel then sounded the whistle signal calling for brakes and Engineer Wartz also sounded this signal. The speed of the train increased rapidly and Engineer Kimmel tried to reverse his engine but was unable to do so. He then told the fireman there was nothing more they could do and the enginemen and fireman jumped from the train at a point about 50 car lengths east of the tunnel while the train was running at a speed estimated by them to have been about 30 miles an hour.

The train passed Manila, a station at the eastern portal of the tunnel at 6:16 a.m., it passed N.A. tower, three miles from Manila at 6:20; Philson, 2.4 miles from N. A. tower at 6:22; and was derailed about 6:24 a.m., at a point about two miles from Philson. It is estimated that the speed of the train at the time of the derailment was between 80 and 90 miles an hour. The train went off on the south side of the track and plunged into the side of the mountain which at this point rises at an angle of about 30 degrees to a height of 400 or 500 feet above the track.

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On the opposite side of the track there is a concrete wall about 6 feet high, supporting the track and protecting it from a creek flowing at its base. Both engines and the 42 cars were piled in a space about 300 feet long. The leading engine was not as badly damaged as the second one; its pilot was not broken off and the machinery was not seriously damaged. Its condition leads to the belief that the second engine, being the heavier, was the first to turn over.

Engine 2354 was equipped with two 9½ inch air pumps and engine 2541 with two 11 inch air pumps. The train line pressure used on this train was 75 pounds and the main reservoir pressure 95 pounds. The total weight of engine 2354 with tender was 326,500 pounds; and of engine 2541 with tender, 352,000 pounds. These engines were braked at 75% of their weight on drivers, and tenders were braked at 100% of total weight. The approximate weight of the train was 2,964 tons. The train consisted of two wooden box cars, 7 wooden gondolas and 33 steel gondolas, nearly all being loaded with coal and coke. These cars were braked at from 59 to 67 per cent of their light weight, with 6" piston travel, and at about 17% of their loaded weight.

Engineman Martz of the second engine, the head brakeman and the middle brakeman were killed. Fireman Specht of the second engine stated that when the head engine had passed out of the tunnel Engineman Kimmel whistled for brakes; Engineman Martz also whistled for brakes and said to the brakeman who was on the engine that he didn't have any air and the brakeman replied that the air had been cut out at the water plug. Engineman Martz then cut in his pump and tried to make an application of the brakes, but it did not have any effect, and he directed the fireman to go out and see whether the air pumps were working. Specht stated that he went out and found the pumps were working and he so informed the engineman, who then directed him to go up on the leading engine and find out what was the trouble. Fireman Specht started toward the leading engine and was trying to pass from the pilot of the second engine to the tender of the leading engine when the accident occurred.

When the wreckage was cleared up it was found that the second engine had been reversed. The cut-off valve on the second engine and the angle cocks on the rear ends of both engines were so badly damaged that it was impossible to determine their positions at the time of the accident. Several of the undamaged triples in the train were examined after the accident and their condition indicated that there had been no air in the train line.

Engineman Kimmel stated that when he jumped from the train and had regained his feet about half of the train had passed him. The only brakes which he noticed that were set were on three or four of the rear cars.

Conductor Kingler stated that his brakeman had been informed that at Sand Paton helping engine 2354 would be taken off from the head end and placed on the rear end of the train, but upon arrival at Sand Paton he informed Head Brakeman Masters that

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this engine would remain on the head end until the train had passed through the tunnel. He instructed Masters to set two brakes on the head end of the train before stopping at the eastern portal to cut off the leading engine. Conductor Ringler stated that he heard no whistle signal calling for brakes; the first indication he had of any trouble was when the train emerged from the tunnel and did not stop. He immediately started out over the train with a brake club to set brakes, and he stated that he had set five or six brakes when the train passed Philson tower where he noticed the home signal was in the stop position. He then returned to the caboose and asked the flagman about the air brake valve. The flagman stated that he had already opened the valve but that there was no air in the train line. Conductor Ringler then went out on the rear end of his caboose and was standing on the platform when the accident occurred.

Flagman Smith stated that when the train was more than half way through the tunnel it slowed down somewhat, but as the train approached the eastern portal he said to the conductor that he did not believe the train could be stopped in time to clear the switch. As soon as the train passed out of the tunnel he stated that the conductor went out on the train and began to set the hand brakes, and that he opened the air brake valve in the caboose but found that there was no air in the train line. He followed Conductor Ringler out on the train but could not do anything, as he had been unable to find a brake club. He then returned to the caboose and remained there until the accident occurred.

The caboose was not equipped with an air gauge and the employees in the caboose had no knowledge of the absence of air from the train line until an attempt was made to operate the air valve in the caboose.

Engineman Kimmel had been examined on air brakes on December 4, 1912, and attained a rating of 88 per cent. Engineman Martz was examined on air brakes on December 13, 1906, and attained a rating of 72 per cent. None of the other members of this train crew had been examined on air brakes and it does not appear that the railroad company has any record concerning their air brake efficiency. While the ratings attained by the enginemen were rather low, both of them, as well as the other members of the crew, appear to have been familiar with the Sand Patch grade. The records of all six years involved were good, and none of them was on duty contrary to any of the provisions of the hours of service law.

Inspectors are located at Sand Patch and an inspection of the air brakes in this train was made at that point, the inspectors starting at the head end of the train and working back until they met the conductor who had started at the caboose and was working forward. In this inspection four cars were found on which the air brakes were not working. The inspection was made

by walking along the side of the train and noting the length of the piston travel after the train had been brought to a stop by a service application of the brakes in which a 25-pound reduction of train line pressure was made. After this stop the engines were uncoupled from the train for the purpose of taking water, and when they were again attached to the train the brakes were not applied nor any inspection or test made to determine their condition. As a result of this neglect the train left Sand Patch without any person having knowledge of the condition of the brakes.

The car inspector on duty at Sand Patch when extra 2541 passed was 20 years old, and had been employed as an inspector about 18 months; prior to that he had been employed as a section hand. He had one helper who had been employed as an inspector about 3 months, following about 4 years' service as a section hand. The helper had been given no instructions with regard to air brakes or his duties as an inspector, except what he received from the inspector with whom he worked, and the only instructions received by this inspector in turn were given him by the leading car inspector who was on duty during the day time, and who had been located at Sand Patch for a period of 20 years.

The rules of the Baltimore & Ohio Railroad Company require that "trains on descending grades must be controlled by use of the air brakes, supplemented by the application of such hand brakes as may be necessary to insure safe movement of the train."

In view of this requirement special attention should be given air brake equipment at Sand Patch to insure that brakes are in proper condition before trains are permitted to descend the grade. This is particularly true with respect to heavy tonnage trains such as extra 2541. This train had 2,964 tons, equal to 69 tons per brake had all brakes been in operation. However, the cursory inspection given the train while the engines were taking water showed 4 cars with their brakes out, leaving but 39 brakes available to control the train, or an average of 76 tons per brake.

The Superintendent of this division of the Baltimore & Ohio Railroad stated that the inspections at Sand Patch are intended only as running inspections, and are simply for the purpose of determining whether trains have the required percentage of air brakes in working condition, and of finding defective cars. Only minor repairs are made at this point, and cars are not set out except for material defects that would affect the safety of trains on this grade.

The inspector on duty at Sand Patch at the time of this accident stated that whenever he found a train without the required percentage of air brakes in working condition he had it out down until it had enough brakes in working order to give it the required percentage, but apart from this he was not permitted to delay trains to complete inspections or to make an air brake test.

He admitted that he had no certain knowledge of the condition of the brakes on this train, and did not even know whether it had the required percentage of air. He simply took it for granted that his helper had been over the train and found the brakes all right.

Special rules printed in the time table in effect on this division require that at any point where a change is made in a train the air brakes must be tested by the engineer, and that all eastbound third-class and extra freight trains must stop at Sand Patch and make the prescribed test of air brakes before starting down the grade. The test prescribed is as follows:

"As soon as the locomotive is coupled to the train and the pressure is equalized throughout the train, the engineer, upon request of a trainman or inspector, will make a full service application (25-lb. reduction of pressure) of the air brakes, and hold them until the trainman or inspectors have examined the brakes on the tender and on each car."

These special rules were not observed in this instance and the statements of employees indicated that it was not customary to make the inspection and test prescribed at this point.

As a result of the investigation it is believed that in anticipating of cutting off the leading engine at Sand Patch one of the brakemen turned the angle cock between the two engines and failed to turn it back again when he was informed that the leading engine would go through the tunnel at the head end of the train; or that in coupling the engines to the train after taking water one of the angle cocks was left closed.

This accident was caused by the failure of the crew of this train to make the prescribed air brake test after the engines had been coupled on and the train was ready to leave Sand Patch, and the failure of some member of the crew properly to connect the air brake train line, resulting in the absence of compressed air from the train line and consequent failure of the brakes to operate when needed to control the train on the grade.

This investigation disclosed the fact that the inspection given trains at Sand Patch is not adequate to provide the crew of a train leaving that point with full and accurate information regarding the condition of the air brakes on their train, and that the rule requiring air brake tests to be made on trains before leaving this point is habitually disregarded.

To prevent the recurrence of accidents of this character the rules requiring thorough inspection and test of air brakes

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at Sand Patch should be rigidly enforced in order that train crews may know positively the condition of the brakes on their trains when leaving Sand Patch. In view of the importance of the inspections and tests which should be made at Sand Patch, competent car and air brake inspectors should be stationed at that point.

( As an additional safeguard, caboose cars should be equipped with air gauges in order that employees in the caboose may at any time easily ascertain the air brake train line pressure.