

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2484
THE DENVER AND SALT LAKE RAILWAY COMPANY
REPORT IN RE ACCIDENT
NEAR GORE, COLO., ON
FEBRUARY 24, 1941

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SUMMARY

Railroad: Denver and Salt Lake
Date: February 24, 1941
Location: Gore, Colo.
Kind of accident: Derailment
Train involved: Freight
Train number: 41
Engine number: 3607
Consist: 48 cars, caboose
Speed: 10-18 m. p. h.
Operation: Timetable and train orders
Track: Single; 5°20' right curve; 0.83
percent descending grade westward
Weather: Clear
Time: 2:40 p. m.
Casualties: 1 killed
Cause: Accident caused by rock slide

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2484

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS
UNDER THE ACCIDENT REPORTS ACT OF MAY 6, 1910.

THE DENVER AND SALT LAKE RAILWAY COMPANY

April 21, 1941

Accident near Gore, Colo., on February 24, 1941, caused
by rock slide.

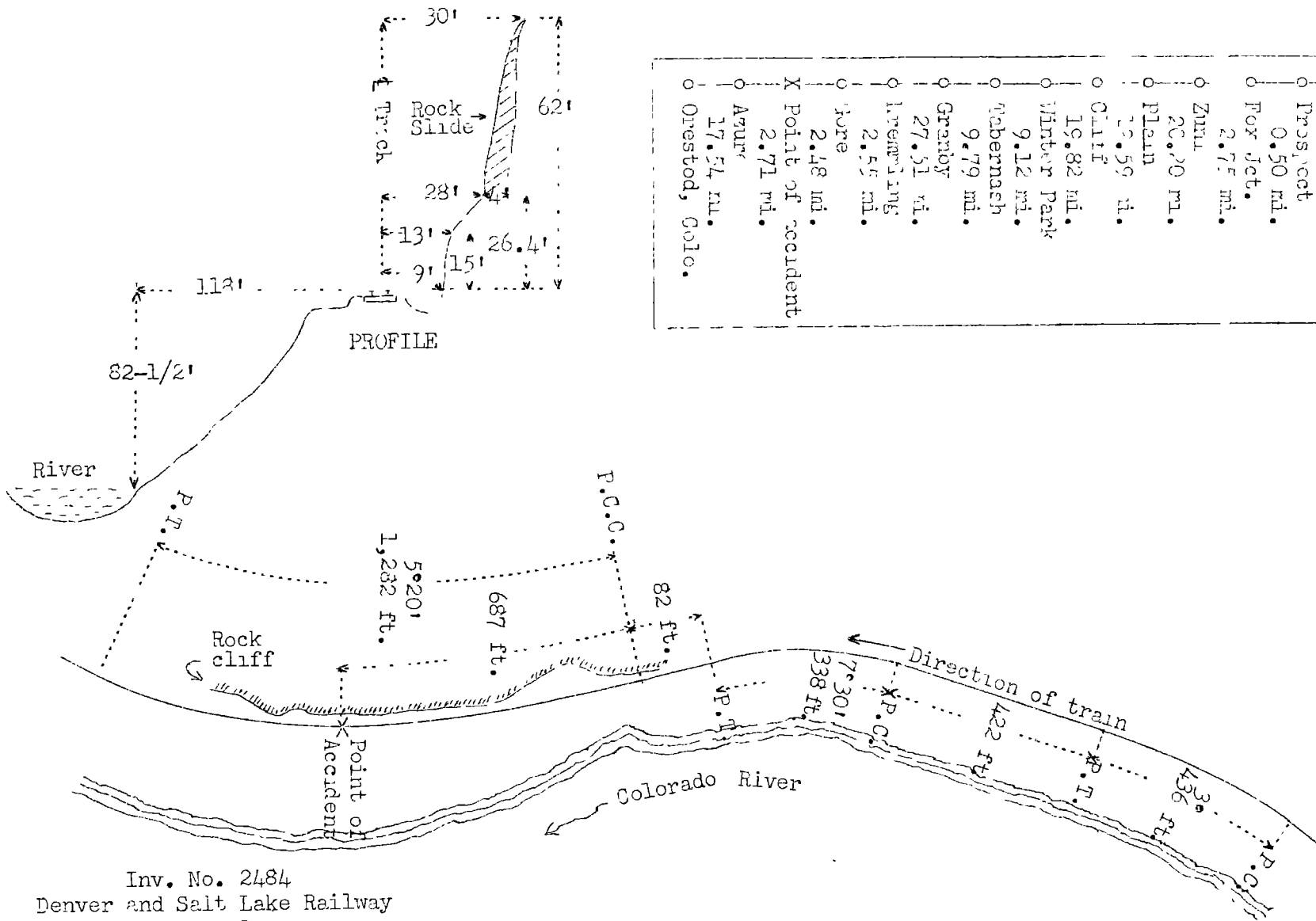
REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On February 24, 1941, there was a derailment of a freight train on the Denver and Salt Lake Railway near Gore, Colo., which resulted in the death of one employee. This accident was investigated in conjunction with the Public Utilities Commission of Colorado.

¹Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.

o	1.00 mi.
o	Prospect
o	0.50 mi.
o	Fox Jct.
o	2.75 mi.
o	Zuni
o	20.20 mi.
o	Plain
o	12.59 mi.
o	Cliff
o	19.82 mi.
o	Winter Park
o	9.12 mi.
o	Gabernash
o	9.79 mi.
o	Granby
o	27.51 mi.
o	Leadville
o	2.55 mi.
o	Gore
o	2.48 mi.
X	Point of accident
o	2.71 mi.
o	Azure
o	17.54 mi.
o	Orestod, Colo.



Inv. No. 2484
 Denver and Salt Lake Railway
 Gore, Colo.
 February 24, 1941

Location and Method of Operation

This accident occurred on that part of Subdivision 1 which extends between Denver and Orestod, Colo., a distance of 128.56 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by timetable and train orders; there is no block system in use. Trains of the Denver & Rio Grande Western Railroad, hereinafter referred to as the D. & R. G. W., are operated over this portion of the Denver and Salt Lake Railway, hereinafter referred to as the D. & S. L. The accident occurred at a point 2.48 miles west of Gore. As the point of accident is approached from the east there is a series of curves and tangents followed, in succession, by a 3° curve to the left 436 feet in length, a tangent 422 feet, a $7^{\circ}50'$ curve to the left 338 feet, a tangent 82 feet, and a compound curve to the right 1,282 feet, the maximum curvature of which is $5^{\circ}20'$; the derailment occurred on the last-mentioned curve at a point 595 feet from its eastern end, at which point the curvature is $4^{\circ}40'$. The grade for west-bound trains varies between 0.71 and 1.00 percent descending more than 6,000 feet to the point of accident, and it is 0.83 percent at the point of accident.

In the vicinity of the point of accident the track parallels the north bank of the Colorado River. The track is laid on a hillside and is 82-1/2 feet above the level of the shore line of the river and 118 feet horizontally distant. The embankment above the shore line is composed of loose rock. The shoulder of the roadbed is 11-1/2 feet from the center-line of the track. On the north side of the track, in the immediate vicinity of the point of accident, the toe of a wall of granite is 9 feet north of the center-line of the track; at distances of 15, 28.4, and 62 feet above the rails the wall is, respectively, 13, 28, and 30 feet horizontally distant from the center-line of the track.

The track structure consists of 100-pound rail, 39 feet in length, laid new in 1937 on an average of 23 oak ties to the rail length; it is fully tieplated, double-spiked, provided with 4 rail anchors per rail length, and is ballasted with 12 inches of cinders.

Because of track curvature and the rock cliff, the view of the point where the accident occurred from the right side of the cab of a west-bound engine is restricted to a distance of 203 feet.

Rules and Regulations of the Operating Department read in part as follows:

825. * * *

Where rocks are liable to roll in stormy or rainy weather or where slides are liable to occur, speed should be regulated to insure safety.

The maximum authorized speed for freight trains in the vicinity of the point of accident is 25 miles per hour.

The weather was clear at the time of the accident, which occurred about 2:40 p. m.

Description

No. 41, a west-bound second-class D. & R. G. W. freight train, with Conductor Walters and Engineman Willingham in charge, consisted of engine 3607, of the 2-8-8-2 type, 1 auxiliary water car, 43 loaded and 5 empty cars and a caboose. This train departed from Zuni, 101.58 miles east of Gore, at 9:31 a. m., according to the train sheet, 4 hours 31 minutes late, and passed Tabernash, 39.85 miles east of Gore, at 1:30 p. m., 4 hours 45 minutes late. At Tabernash the crew received copies of train order No. 558, which read as follows:

Account wet snow rocks reported falling in Gore and Byers Canons.

No 41 passed Kremmling, 2.55 miles east of Gore and the last open office, at 2:30 p. m., 4 hours 19 minutes late, passed Gore, and struck a rock slide and was derailed while moving at a speed estimated at 10 to 18 miles per hour.

The engine stopped on its left side down the embankment, badly damaged, with the front end 156 feet west of the point of derailment and 112 feet south of the center of the track; the rear end of the engine was about 95 feet south of the center of the track; the cab was demolished. The tender stopped on its left side to the rear of the engine and almost at right angles to the track. The auxiliary water car stopped bottom up, parallel to the engine, and leaned against the engine; both trucks were detached. The second car stopped on its left side behind the tender, at right angles to the track, and its front end was 51 feet from the center of the track; both trucks were detached. The third car leaned against the rear end of the second car; the front end of the third car was 25.7 feet and the rear end 5.7 feet from the center of the track. The fourth car was derailed but stopped upright on the roadbed. The front truck of the fifth car was derailed.

The employee killed was the engineman.

Summary of Evidence

Fireman Hamilton stated that an air-brake test was made at Denver, 105.85 miles east of Gore, cars were added to the train at Prospect, 1 mile west of Denver, and another air-brake test was made at Fox Jct., 0.5 mile west of Prospect; the brakes were used frequently en route to control the speed of the train and they functioned properly. Brake-pipe pressure of 80 pounds was being maintained. He read train order No. 558 and understood that his train was required to move at reduced speed and the crew was required to look out for falling rocks or rock slides in Gore Canyon and Byers Canyon. As the train approached the point where the accident occurred, both he and the engineman were maintaining a lookout ahead. The engineman made a brake-pipe reduction of 10 or 15 pounds, which was released about 800 feet east of the point where the accident occurred. The driving-wheel brakes were cut out in conformity with instructions to prevent the overheating of tires. After the brakes were released, the speed increased to about 15 or 18 miles per hour. The fireman said that a slower speed could not be maintained by the application and release of the brakes because of the possibility of the train breaking in two if the air brakes were released at a lower speed; the train would have to be stopped in order to release the brakes. The first the fireman knew of anything being wrong was when the engineman called a warning and immediately applied the air brakes in emergency but too late to stop short of the rock slide. The engineman did not have time to cut in the driving-wheel brakes, which had been cut out previously. Because of track curvature, the fireman could not see the obstruction on the track. He said that the engineman probably could not see more than 100 feet ahead because of the rock cliff being on the inside of the curve. The fireman expressed the opinion that the brake-pipe pressure had not been fully restored and that an emergency application of the air brakes was not fully obtained. In his opinion the engineman controlled the speed of the train properly, in accordance with the requirements of train order No. 558, but the engineman was unable to see the rock slide a sufficient distance in which to stop. The engineman appeared normal. Had the fireman been alarmed that the train was not being properly controlled, he said he would have cautioned the engineman. The accident occurred at 2:39 p. m., at which time the weather was clear.

Road Foreman of Equipment Heald, of the D. & R. G. W., who was on the tender of the engine at the time of the derailment, stated that the brakes functioned properly en route. He ob-

served that the engineman was normal and alert, and that the engineman operated the engine in a capable manner. As the train was approaching the point where the accident occurred, he and front brakeman were in the booth on the top of the tender. The road foreman of equipment said that the first he knew of anything being wrong was when the tender became derailed and overturned down the embankment. He estimated that the speed of the train was 17 or 18 miles per hour at the time of the accident, which occurred at 2:40 p. m. After the accident occurred he observed three large rocks on the track; two of these were between the rails. Another large rock, which bore indications of having been struck by the engine, lay down the embankment near the engine. In his opinion these rocks fell from the cliff located north of the track. He thought a train similar to No. 41 moving on the 0.83 percent descending grade at a speed of 17 or 18 miles per hour could be stopped by an emergency air-brake application within a distance of 400 to 420 feet. He did not know whether an air-brake application was made immediately prior to the accident. He said that when trains are moving on descending grades it is the practice to cut out pressure to the driving-wheel brake-cylinders on engines of the type involved, to prevent overheating the tires. A cut-out cock is located within reach of an engineman so that he may cut the brake-cylinder pressure in or out at will. In most instances a train similar to the one involved could be controlled by application and release of the train air-brakes so that a speed as low as 5 to 10 miles per hour could be maintained without causing a severe stretchout or break-in-two.

Front Brakeman Tipton corroborated the statement of the road foreman of equipment in all essential details. The front brakeman said that the speed was 10 or 12 miles per hour at the point where the accident occurred. The train was being operated under proper control in compliance with the information concerning rocks reported falling in Gore Canyon. To his knowledge there had never been a rock slide at this location prior to the one involved in this accident.

Conductor Walters stated that as his train approached the point where the accident occurred he was in the cupola of the caboose, the speed was 15 or 18 miles per hour, and the caboose gauge indicated that a brake-pipe pressure of 90 pounds was being maintained. As the train moved on the descending grade the brakes were applied and released to control the speed of the train. The weather was clear. He felt the brakes become applied in emergency and the train stopped at 2:40 p. m. He proceeded to the front end and found that the engine and six cars were derailed and that several large rocks were on the track. At a point about 30 feet above the track there was a cavity from

which the rocks apparently had fallen. There was a sheet of ice on the face of the cavity; this condition indicated that water had entered a crevice, had frozen, and had pried the rock outward. He had read train order No. 558 and understood it to mean the train should be controlled according to the physical characteristics of the track in the territory involved; that in places where the view was not obscured, normal speed could be maintained, but in places where the view ahead was obscured the speed should be reduced accordingly. In his opinion the order should have specified restricted speed, if such was intended. Restricted speed requires a train to be operated in such manner that it can be stopped short of train or obstruction. He thought the train was moving on the descending grade under control and in compliance with the information contained in train order No. 558, provided that the rocks had been on the track before the engine reached the point where it was possible for the engineman to see them.

Flagman Walker corroborated the statement of Conductor Walters.

Section Foreman Gill stated that he was in charge of the section on which the accident occurred. On the day of the accident he patrolled the track involved on his track motor-car twice during the morning and once in the afternoon; on the last trip he passed around the curve involved about 1:50 p. m., or about 50 minutes prior to the occurrence of the accident. No fallen rock was observed on any of these trips. He observed the rock cliff involved but there was nothing unusual about its appearance. After the occurrence of the accident one large rock, which weighed about 20 tons, was lying across the north rail of the track. About 15 to 30 feet west of the large rock there were two other rocks which weighed about 8 or 10 tons each and apparently had broken from the larger rock. He said that several days prior to the accident there had been a wet snow storm and more rocks than usual fell during this period. This was the first instance of which he had knowledge that rock had fallen at this point.

Engineer Maintenance of Way Turner, of the D. & S. L., stated that the section of rock which fell was 35.6 feet long, 10 feet wide and 4 feet thick at the base, and 2 feet wide at the top; the thickness tapered to practically 1 inch at the top. The rock fell from an almost vertical wall on the north side of the track. The rock fell outward from the wall between points located 26.4 and 62 feet above the level of the rail. The lower edge of the break was 28 feet horizontally distant and the top was 30 feet horizontally distant from the center of the track. At the point where the rock became dislodged the stratum was

practically vertical; the formation was gray granite, slightly checked. There was no soil mixed with the rock. The first mark of derailment was at a point 13 feet east of the vertical center line of the cavity from which the rock had fallen. At this point the outside of the north rail bore marks of having been struck by rocks. At a point 25 feet farther west there were indications that a portion of the rock became wedged between the engine and the rock cliff. A section of track 53 feet long was destroyed. Six days prior to the occurrence of the accident the section foreman reported that rocks in Gore Canyon had started to loosen; as a precautionary measure the maintenance-of-way engineer ordered the track patrolled night and day throughout a distance of 13 miles, which included Gore Canyon. A train order which contained information relative to falling rocks in Gore Canyon and Byers Canyon had been in effect for several days prior to the occurrence of the accident. He said that an endeavor is made to patrol this territory ahead of all trains, if possible, particularly passenger trains. Slides frequently occur throughout the canyon district but no trouble had been experienced previously with rock slides at the point involved. The rock fault could not have been detected by visual inspection prior to the time the rock became dislodged. Within a period of two or three days prior to the accident there had been several snow storms. The weather became warmer in the daytime, the snow melted and water flowed into the vertical seams; at night low temperature caused the water to freeze and the rock to loosen. In his opinion this alternate thawing and freezing resulted in the rock falling from the cliff. On February 26 he observed that, from the right side of a west-bound engine of the type involved, the right rail at the point of derailment could be first seen a distance of 203 feet.

Chief Mechanical Officer Sagstetter, of the D. & R. G. W., stated that after the accident occurred the automatic brake valve of engine 3607 was in emergency position.

During the 30-day period prior to the occurrence of the accident, the average daily movement over the point involved was 16.13 trains.

Observations of the Commission's Inspectors

The Commission's inspectors observed that the right front cylinder-head, the right pilot-sill step and the right side of the pilot were badly damaged; this indicated that these parts of the engine had struck some object. The reverse lever was in position for forward motion and the throttle was closed. The left rail at the point of derailment had been torn out during the process of derailment and lay down the embankment.

Discussion

According to the evidence, No. 41 was moving on a descending grade and around a compound curve to the right at a speed estimated at 10 to 18 miles per hour when the engineman gave warning of a rock slide a short distance in advance of the engine and applied the air brakes in emergency, but he did not have time to cut in the driving-wheel brakes, which had previously been cut out; the distance was too short in which to stop the train short of the obstruction. The engine struck the rock and the derailment followed. The maximum authorized speed for freight trains at the point involved was 25 miles per hour. The crew held a train order which contained information that rocks were falling in Gore Canyon; however, the train order contained no specific speed restriction. After the accident occurred, examination disclosed that a section of granite 35.6 feet long, 10 feet wide and 4 feet thick at the base, and 2 feet wide at the top, had fallen from the wall on the north side of the track. The original position of the base of this rock was 26.4 feet above the level of the rails.

Because of track curvature, the engineman could not see the obstruction a distance greater than 203 feet. Apparently, the engineman saw the fallen rock as soon as it was possible to do so. The engineman was required to maintain a lookout for rocks in the vicinity of the point of accident, and the speed was variously estimated at 10 to 18 miles per hour, which is 7 to 15 miles per hour less than the maximum authorized speed; however, it is apparent that the speed of the train was too high for stopping it short of the obstruction. The driving-wheel brakes were cut out but the other brakes functioned properly en route. Why the engineman failed to maintain a speed low enough that the train could be stopped short of the obstruction could not be determined, as he was killed in the accident.

The evidence was to the effect that no slide had occurred previously at this point. When a section crew passed the point involved on a track motor-car about 50 minutes before the accident occurred, nothing unusual was observed about the appearance of the rock cliff. The exact time of the occurrence of the slide is not known. Prior to the time the rock became dislodged the rock fault was concealed. There had been several snow storms within a period of two or three days prior to the accident. Since ice covered the surface of the cavity, apparently during the daytime, warm weather caused the snow to melt, water flowed into vertical crevices, and at night low temperature caused the

water to freeze, which tended to loosen the rock and the alternate thawing and freezing caused the rock to slip from its original position.

Cause

It is found that this accident was caused by a rock slide.

Dated at Washington, D. C., this twenty-first day of April, 1941.

By the Commission, Commissioner Patterson.

W. P. EARLE,

(SEAL)

Secretary.