

INTERSTATE COMMERCE COMMISSION

WASHINGTON

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REPORT OF THE DIRECTOR

BUREAU OF SAFETY

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ACCIDENT ON THE  
BALTIMORE AND OHIO RAILROAD

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HOPE, OHIO

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DECEMBER 26, 1938

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INVESTIGATION NO. 2319

SUMMARY

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Inv-2319

Railroad: Baltimore and Ohio  
Date: December 26, 1938  
Location: Hope, Ohio  
Kind of accident: Derailment  
Train involved: Freight  
Train number: 94  
Engine numbers: 4509-4535  
Consist: 53 cars and caboose  
Speed: 34-45 m. p. h.  
Operation: Timetable, train orders and automatic  
block-signal system  
Track: Single; 2°10' curve to the right; 0.68  
percent ascending grade for eastward  
trains  
Weather: Rain intermittently  
Time: 11:10 p.m.  
Casualties: 1 killed, 6 injured  
Cause: Rock on track

Inv-2319

February 8, 1939

To the Commission:

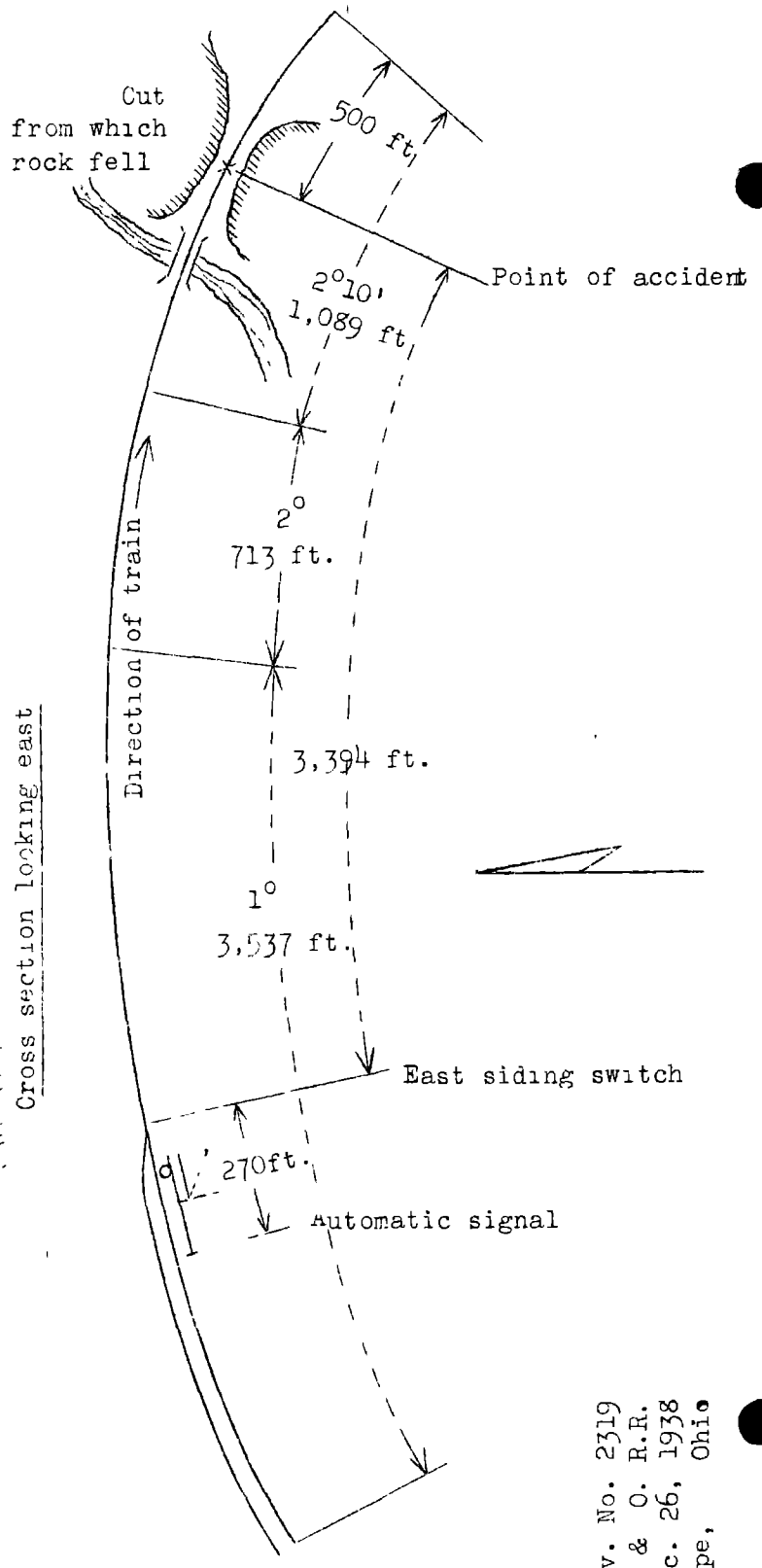
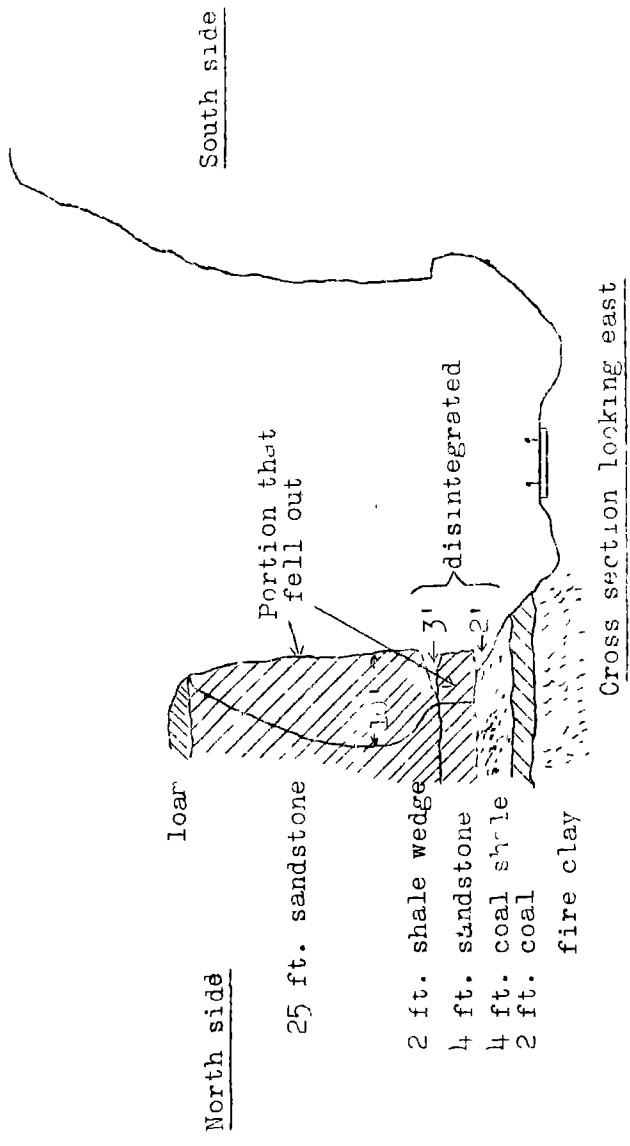
On December 26, 1938, there was a derailment of a freight train on the Baltimore and Ohio Railroad near Hope, Ohio, which resulted in the death of one employee and the injury of six employees. The investigation of this accident was made in conjunction with a representative of the Public Utilities Commission of Ohio.

#### Location and Method of Operation

This accident occurred on that part of the Ohio Division designated as the Parkersburg Sub-division, which extends between Chillicothe, Ohio, and Parkersburg, W. Va., a distance of 97.4 miles. In the vicinity of the point of accident this is a single-track line over which trains are operated by timetable, train orders and an automatic block-signal system. The accident occurred at a point 3,394 feet east of the east siding switch at Hope. Approaching the point of accident from the west there is a compound curve to the right 5,339 feet in length consisting of a 1° curve a distance of 3,537 feet, a 2° curve a distance of 713 feet, and a 2°10' curve a distance of 1,089 feet; the accident occurred on this last-mentioned curve 500 feet from its eastern end. The grade is slightly undulating a distance of several miles; it is 0.68 percent ascending for east-bound trains at the point of accident. The maximum speed permitted for fast freight trains, the type involved, is 45 miles per hour.

The track structure consists of 100-pound rail, 39 feet in length, laid on an average of 22 treated ties to the rail length; it is double-spiked, fully tieplated, with 6 rail anchors to the rail length, and is ballasted with gravel to a depth of 7 inches. The track is well maintained. In the vicinity of the point of accident the track is laid in a cut 320 feet in length, with a practically vertical wall 40 feet in height on the north side and practically vertical the same distance on the south, with a one to one slope to the top an additional distance of 20 feet. The width of the cut at the bottom is about 46 feet and it is ditched at each side for drainage. The cut formation consists of a sub-soil of clay, above which there are strata of coal 2 feet thick, coal shale 4 feet thick and sandstone 4 feet, a wedge of coal shale 3 feet thick at its outer edge, then 25 feet

o Parkersburg, W.Va.  
 52.1 mi.  
 X Point of accident  
 o Hope  
 45.3 mi.  
 o Chillicothe, Ohio



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of sandstone, the top of which is covered with loam varying from 6 inches to several feet in depth.

A cut similar to the one in which the accident occurred is located about 450 feet west thereof, and owing to the curvature of the track the view of the point of accident had at night by the engineman of an approaching east-bound train is restricted to about 350 feet.

The last automatic signal governing eastward trains is located 3,664 feet west of the point of accident.

A light rain had been falling intermittently but it was not raining at the time of the accident, which occurred at 11:10 p.m.

#### Description

No. 24, an east-bound freight train, consisted of 56 loaded and 7 empty cars and a caboose hauled by engines 4509 and 4535, and was in charge of Conductor Dullmeyer and Enginemen Landrum and Daehl. This train departed from Chillicothe, Ohio, 45.3 miles west of Hope, at 9:39 p.m., according to the train sheet, 6 hours 29 minutes late, and left Zaleski, the last open office, 3.6 miles west of Hope, at 11:02 p.m., 6 hours 42 minutes late, and shortly after passing Hope, it was derailed upon striking a rock while traveling at a speed estimated to have been between 35 and 45 miles per hour.

Both engines, their tenders and the first 14 cars were derailed. The first engine and its tender stopped on their right sides to the right of and parallel to the track, with the front end of the engine about 205 feet beyond the point of derailment. The second engine stopped to the right of the track, leaning at an angle of about 45 degrees against the south wall of the cut; its tender became uncoupled and stopped across the track. The first 13 cars jack-knifed and stopped side by side at right angles to and upon the track within a distance of about 200 feet; the fourteenth car remained in general line with the track. The engines and cars were badly damaged; 8 of the cars were destroyed. The employee killed was the engineman of the lead engine, and the six other members of the crew were injured.

#### Summary of Evidence

Head Brakeman Lewis, who was on the lead engine, stated that an air-brake test was made at Chillicothe and the brakes functioned properly en route. After leaving Zaleski he was on the brakeman's seatbox in front of the fireman. The train had passed through rain en route. They received proceed indications on all

the signals and were traveling at a speed of about 35 or 40 miles per hour when the engineman called a warning, at which time the brakeman judged the engine to be just east of the bridge located at the west end of the cut, or about 100 feet from the point of accident. The engineman closed the throttle and applied the air brakes in emergency. Brakeman Lewis caught a glimpse of the rock on the track when the engine was about 50 feet from it, but was unable to give its size or position. The headlight was burning brightly, but as they were rounding the curve its reflection would be on the north side of the cut. No trouble had been experienced with either engine en route and no steam was escaping that would obscure the vision in any way. Brakeman Lewis had been working on this division about 20 years and did not have any recollection of ever finding a rock on the track or any condition that might be considered unsafe.

Fireman Burke, of the lead engine, estimated the speed of their train to have been from 40 to 45 miles per hour when he heard the engineman call a warning. He was standing on the deck and for that reason did not see the obstruction ahead.

Engineman Diehl, of the second engine, stated that their train was traveling at a speed of 40 or 45 miles per hour when he saw a large rock lying in the ditch on the south side of the track and it extended up to the rail; his engine was about 7 car lengths distant when he first saw it. He immediately closed the throttle and about that time the air brakes were applied in emergency but the distance being too short in which to stop, the train struck the rock. The train seemed to stop for an instant and then plunged ahead and at the same time turned to the right. The view ahead was not obscured by steam or smoke and he had heard the whistle signal sounded by the lead engineman for the road crossings located just west of the point of accident. After the accident he entered the cab of the first engine and saw that the throttle was closed but he did not observe the position of the brake valve. He had been working on this division for 33 years and had never before found any large rocks on the track in this cut and he had never noticed any indication that a rock-fall might occur at that point.

Fireman Brandenburg, of the second engine, stated that he had never seen evidence of a possible rock-fall at this point.

Conductor Dullmeyer and Flagman Johnston, who were in the cupola of the caboose, estimated the speed of their train to have been between 35 and 40 miles per hour when the train stopped suddenly and they did not hear or feel the air brakes become applied. The conductor said the accident occurred at 11:10 p.m.

Section Foreman Ilderton stated that he has been in charge of the section on which the accident occurred since July,

1938. He has three men in his crew besides himself and the section consists of 7 miles of track, with 7 cuts. The section is patrolled chiefly by motor car, although he walks over the entire section every Saturday. In October he made a thorough inspection of all the rock cuts, and on December 3, because of heavy rainfall the preceding night, he made another inspection of the cut involved from the tops and sides and found no indication of a possible rock-fall. He had experienced some trouble in this cut in keeping the south rail properly surfaced and lined; this he attributed to a water pocket, but it had never been necessary to restrict the speed of trains through the cut. On December 23 he surfaced and lined the track in this cut and walked through it twice on December 24 and did not see anything that would lead him to believe there was any danger of rock falling. Rain started to fall about 10 a.m., December 26, and a moderate rain continued all day, and it was still drizzling when he was called at midnight after the accident. It was his opinion that this rock slide was caused by a break which did not show at the surface. He has been a section foreman since 1930 and is familiar with conditions which might develop in rock cuts. In his inspections of the walls of cuts, he uses a bar for scaling loose rock, sounding, and ascertaining crevice depth. He thought that he had last scaled the cut in which the accident occurred in October.

Supervisor of Track Cole stated that after the accident he examined the cliff from which the rock fell and it showed that a crack about 1 inch wide had extended from the top to the bottom of the cliff; the exposed surface indicated that it was all old fracture except a small area near the top and an area about 12 feet square at a point 6 or 8 feet from the bottom, both of which were new breaks. The top of the crevice had been filled with soil which concealed the crack. Examination of the track indicated that the rails were not broken prior to the accident. He further stated that it is the practice to inspect all rock cuts after the fall rains and in the spring after the freezing and thawing. He has never given any serious consideration to the large cracks in the face of the cliffs as he never thought there was anything loose behind them; most of these cracks were caused by the original blasting. He thought that a detector fence might have prevented this accident but there have not been any rock slides of importance in his territory in the past 3 or 4 years, and he did not think that there had been a rock that had to be taken down or that has fallen from this cut on the north side since 1917. He also stated that a ditcher had been run through the cut recently, and he thought that they would not have any more trouble with the soft spot under the south rail as described by the section foreman.

Division Engineer Welch stated that the rock weighed between 60 and 100 tons and the indications were that there had been an old crack which was filled with top soil, and that the crack or cracks had been developing progressively from year to year as only about 10 percent was new break. Measurements made

by an engineer experienced in such work show the following: The distance from the center line of the track to the formation of the original sandstone face of the cut on the north side was 23 feet. The formation from the top of the rail upward is 2 feet of coal, 4 feet coal shale, 4 feet sandstone, 2 feet shale, and 25 feet sandstone. The section which fell out consisted of the material above the coal shale. The length of the outside face parallel with the track is 16 feet and the rear face 2 feet; the maximum distance between the outside and the rear faces was 10 feet at a point  $16\frac{1}{2}$  feet above the rail. The 4-foot thickness of sandstone and the 2-foot of shale broke off at a point 5 feet from the face, at which point the thickness of the shale was 1 inch. The overlying 25 feet of sandstone broke off 5 feet from the face at the bottom, 10 feet at a point  $4\frac{1}{2}$  feet above, 3 feet at 16 feet above, and then tapered off to the top. These breaking distances are at the center of this ledge and gradually decrease to less than 1 foot at each end, horizontally, forming a concave surface. Less than 10 percent of the rear surface of this ledge showed fresh break and there were definite indications of old cracks which could not have been seen. The coal shale was disintegrated 2 feet back of the face of the wall, and the shale wedge was disintegrated 2 feet from the face. The cause of the fall apparently was that the top 25 feet of sandstone ledge rolled out as a result of water freezing in the crevices. The disintegration of the shale and coal shale was a factor in the development, but the fall eventually would have occurred.

Engineman Rice, of No. 2, an east-bound passenger train and the last train to pass through the cut prior to the accident, stated that when his train passed Hope about 9:23 p.m., the weather was clear and his train was traveling at a speed of about 56 miles per hour. He was on the left side of the cab of the motor-car on account of another engineman learning the operation of the car, and he noticed nothing unusual in the cut in which the accident occurred. He also said that during his 40 years experience in this vicinity he had never noticed any stones falling from the walls of this cut other than small objects during the winter season.

#### Discussion

A sandstone rock weighing between 60 and 100 tons became dislodged from an almost vertical wall on the north side of a rock cut and fell upon the track. The break occurred at a point 6 feet above the rails and 5 feet from the face of the wall and extended upward vertically 4 feet; it then deepened until it extended 10 feet from the face at a point  $16\frac{1}{2}$  feet above the rails and then tapered off toward the face until it reached the top of the cliff, leaving a concave surface. A 3-foot shale wedge located between the 4-foot stratum of sandstone and the overlying



25-foot section, as well as 2 feet of coal shale under the 4-foot sandstone section, were disintegrated. The surface of the break showed evidence of old cracks which apparently had been developing over a period of years, and only about 10 percent showed fresh break. The crack had been filled with soil at the top and could not have been detected by inspection. The slide was caused apparently by freezing and thawing of water in the crevices and while the disintegration of the shale and coal shale was a factor in the development, the evidence is to the effect that the break would have occurred eventually. The larger cracks apparently were created when the cut was originally blasted many years ago, and this condition, although known to exist, did not cause any alarm as there had not been a rock that had to be taken down or that had fallen from the north side of this cut in the past 21 years.

At the time the last train passed over this track prior to the accident, which was about 9:23 p.m., there was no evidence of danger. The last automatic block signal west of the point of accident displayed a proceed indication as No. 94 passed it, which would indicate that the rail was not broken by the rock, hence the engineman had no warning of the obstruction on the track. The view in this cut is restricted by the curvature of the track and the engineman did not see the rock on the track until the engine was about 200 feet from it.

#### Conclusion

This accident was caused by the train striking a rock which had fallen upon the track.

Respectfully submitted,

W. J. PATTERSON

Director.