INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY CONCERNING AN ACCIDENT ON THE BALTIMORE & OHIO RAILROAD AT FREDERICK JUNCTION, MD., ON NOVEMBER 4, 1935.

December 11, 1935.

To the Commission:

On November 4, 1935, there was a derailment of a freight train on the Baltimore & Ohio Railroad at Frederick Junction,Md., this accident not resulting in casualties.

## Location and method of operation

This accident occurred on the Baltimore Division, West End, which extends between Point of Rocks and Relay, Md., a distance of 58 miles; in the vicinity of the point of accident this is a double-track line over which trains are operated by time table, train orders, and a manual block-signal system. The point of derailment was on the east-bound main track 810 feet west of the station at Frederick Junction; approaching this point from the west, the track is tangent a distance of 2,764 feet to the point of accident, this tangent extending 532 feet east thereof and being followed by a compound curve to the right 1,850 feet in length, the curvature varying from 2° 45' to 3° 15'. Bridge 55, a deck plate girder bridge, 341.6 feet in length and spanning the Monocacy River, is located on this curve, the west end of the bridge being 698 feet east of the west end of the curve, the track curvature being at its minimum at this point. The grade for east-bound trains is 0.19 percent ascending for a distance of 1.25 miles to the point of accident.

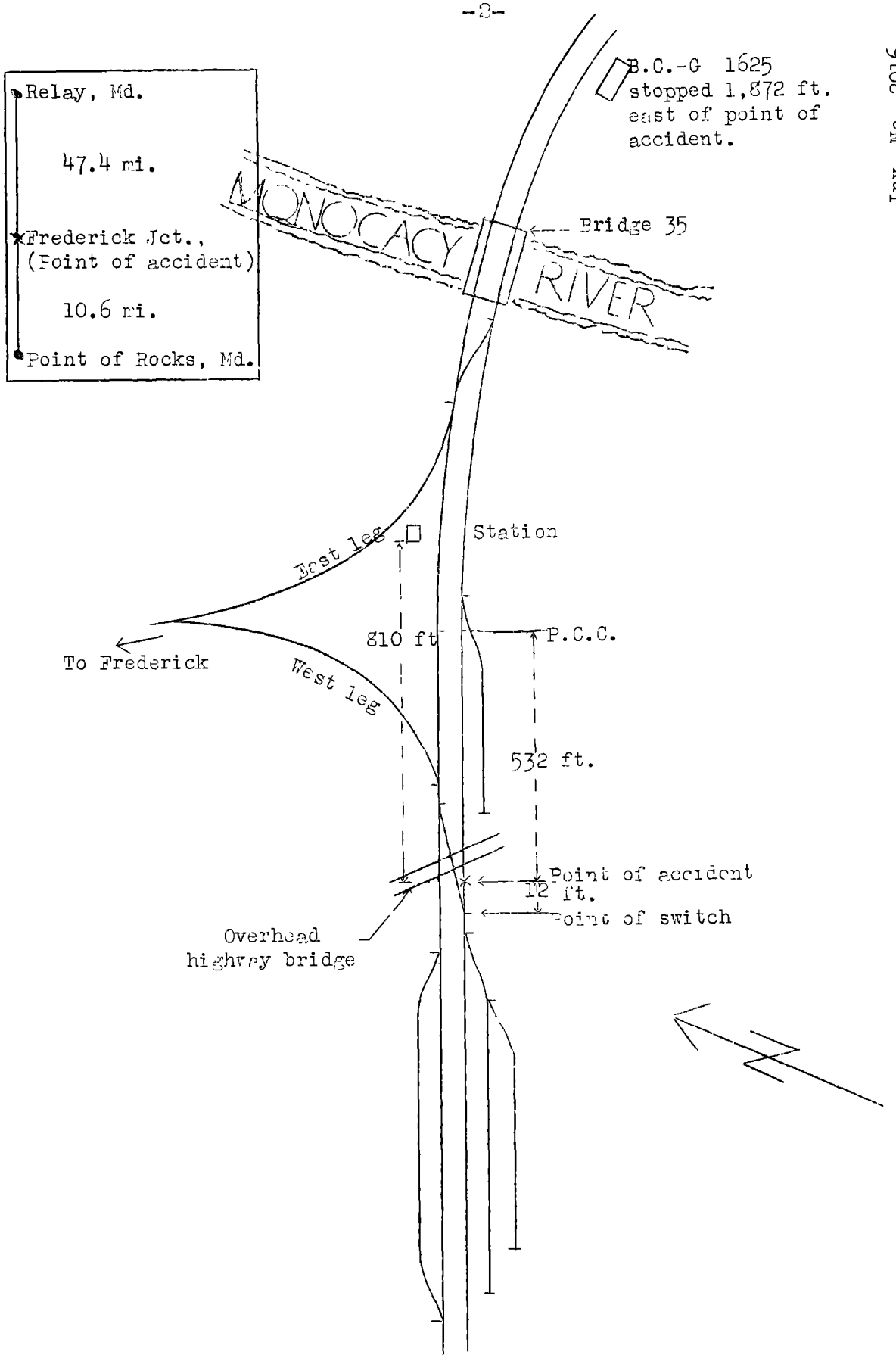
The track is laid with 130-pound rails, 39 feet in length, with 22 ties to the rail length, fully tieplated, and ballasted with stone to a minimum depth of 24 inches.

The weather was cloudy at the time of the accident, which occurred about 5:30 p.m.

## Description

Extra 4488, an east-bound freight train, symbol Philadelphia-94, consisted of 83 cars and a caboose, hauled by engine 4488, and was in charge of Conductor Price and Engineman Beacht; pusher engine 4439, in charge of Engineman Bell, was coupled behind the

Inv. No. 2016
Baltimore & Ohio RR,
Frederick Jct., Md.
Nov. 4, 1935



caboose. This train passed Point of Rocks, 10.6 miles west of Frederick Junction, at 5:15 p.m., according to the train sheet. and was passing through Frederick Junction when it was derailed while traveling at a speed estimated to have been between 30 and 35 miles per hour.

Engine 4488 and the first 17 cars were not derailed; the eighteenth car, Buffalo Creek & Gauley Railroad steel hopper car 1625, loaded with coal, was derailed to the south and stopped on its side parallel with the tracks and east of the Monocacy River, at a point 1,872 feet east of the initial point of derailment; the nineteenth to the twenty-second cars; inclusive, fell into the Monocacy River, south of and opposite bridge 35, while the twenty-third to the thirty-sixth cars, inclusive, were scattered alongside of and across both main tracks, west of the river. The remaining portion of the train was not derailed.

## Summary of evidence

Engineman Beacht stated that while passing over bridge 35 the air brakes were applied in emergency from back in the train and the indicator on the air gauge went to zero, at which time the speed was about 35 miles per hour; at first he thought the train had parted, and he kept the throttle open and worked steam in order to keep the forward and rear portions of the train from colliding; when the forward portion of the train finally stopped it was about 15 or 20 car lengths away from the first car that was derailed, B.C.& G. hopper 1625. Engineman Beacht had looked back along the train while rounding curves en route, but had seen no indication of anything wrong. After the accident he walked back to B.C.& G. hopper 1625 and saw a broken arch bar, and there was an old crack extending through the column-bolt hole from the inside. Statements of Fireman Foster and Head Brakeman Harper were similar to those of Engineman Beacht; they estimated the speed to have been between 30 and 35 miles per hour when the accident occurred.

Conductor Price and Flagman Healy were riding in the caboose; the first knowledge they had of anything wrong was on feeling a run-in of slack, similar to that which occurs when an air hose bursts, and then there were several jerks and the brakes were applied in emergency. After the accident they went forward and saw the derailed cars and the conductor arranged to have the rear portion of the train pulled back to Point of Rocks and detoured. The conductor and flagman had watched the train while rounding curves, looking along both sides of it, but noticed nothing wrong. Conductor Price did not see the broken arch bar mentioned by the engineman.

Engineman Bell and Fireman Brashears, of pusher engine 4439, which was coupled behind the caboose, were unaware of anything

wrong until the run-in of slack occurred, at which time the pusher engineman was working steam; as soon as he saw that the air gauge was dropping he eased the throttle off until the train stopped. The air was cut through between the caboose and the pusher engine and the brakes were under control of the lead engineman.

District Master Car Builder Calder arrived at the scene of the accident about 7:45 p.m. and found that an arch bar was broken on the north side of the rear truck of B.C.& G. hopper 1625; about 75 percent of the fracture was an old break and it was his opinion that this broken arch bar caused the accident. This car was a steel hopper car, 100,000 pounds capacity, and the break occurred in the bottom arch bar at the A-end of the car near the R-4 journal box location, the break being on the inside of the bar and through the outer edge of the column-bolt hole, beneath the column casting. Master Car Builder Calder said that between Dundon, W.Va. where the car received a class "A" inspection, and the point of accident, a distance of more than 300 miles, the car passed "C" inspection points at Gassaway, Grafton, Cumberland and Brunswick, and he was of the opinion that the defect could not have been discovered by a "C" inspection, and thought it very doubtful whether the crack was spread, and enough of the defect visible, so that it could have been detected at the time the "A" inspection was made.

Car Inspector Conrad, at Dundon, W.Va., stated that B.C.& G. hopper 1625 was received in interchange from the Buffalo Creek & Gauley Railroad on the night of October 30, 1935, and that he inspected the car on the morning of October 31, between 7:30 and 10 a.m., after which he tacked a loaded car certification card on it, Form 1157, reading as follows:

> This is to certify that I have given this car "A" inspection as required by latest instructions and it is now in condition to meet A.R.A. loading and interchange rules, also clearance requirements, and is safe to move to destination without further "A" inspection, or being shopped for old defects before unloaded.

This class "A" inspection is for the purpose of discovering all defects so that cars may proceed to destination without further inspection, and includes examination of arch bars and truck sides, couplers, draft gears, yokes and attachments, draft keys, all safety appliances and visible parts of air brakes, foundation brake gear, journal boxes, brasses, wedges and packing. The car inspector is required to loosen corrosion streaks, tap each brake hanger with a hammer, and use a mirror to inspect the inner side of each arch bar, and he said that at the time he used the mirror to inspect B.C.& G. 1625 the weather was foggy and misty,

somewhat obscuring the reflection in the mirror. During his 8-hour tour of duty on October 31, he inspected 74 cars for interchange, along with his other duties, such as making the necessary records, putting in a few carrier-iron bolts, adjusting packing in journal boxes, etc., and he said that since February 7,1935, he had found and shopped 15 cars with broken arch bars, 12 of these being B.C.& G. cars, and he also had found 5 B.& O. cars with defective side truck frames. Car Inspector Conrad could not account for his failure to discover the old defect unless it was concealed by corrosion or rust and grease.

Car Inspector Kronk, at Brunswick, Md., stated that after the train containing B.C.& G. hopper 1625 had arrived at his station during the morning of November 4, he gave it class "C" inspection; this covers general observation on the ground to find any existing safety appliance defects, check lading,open loads, clearances, etc., and requires that each car receiving a "C" inspection should have attached to it a certification card conveying information that it has been given a class "A" inspection, which thereby relieves car inspectors from giving it other than a class "C" inspection en route to its destination on the B.& O. R.R. He said that broken arch bars or side truck frames are seldom found by "C" inspection, and that B.C.& G. car 1625 did not appear on his record of defective cars, but he did shop two cars which arrived in that train, due to defective couplers. The broken arch bar involved was shown to the witness and placed in position on the column casting, and after he examined the old break on the back edge just below the lip of the column casting he said that it was a very difficult defect to detect during the course of a class "A" inspection, and that it was extremely doubtful whether it would have been detected by mirror inspection with the truck assembled under the loaded car.

The specifications covering the construction of the car involved in this accident called for arch bars to be made of wrought iron or steel, but Engineer of Tests Van Gundy of the Baltimore & Ohio reported that the broken arch bar was made of common iron, badly laminated, and contained more or less steel scrap. The chemical analysis showed the following: carbon .09; sulphur .046; phosphorus .103; manganese .20, while microscopic examination showed no indication of burning. The Buffalo Creek & Gauley Railroad had no record of the arch bars under this car having been renewed on their own or foreign lines.

The break occurred in the lower arch bar at the column bolt hole nearest the R-4 journal box location, rear truck, north side, A-end. The cross section of the defective arch bar was $1\frac{1}{2}$ x 5 inches, and it was drilled for column bolt holes $1\frac{3}{4}$ inches in diameter. Approximately 75 percent of the fracture was old and considerably oxidized; this old fracture extended

from the inner side of the arch bar to the column bolt hole and continued through approximately 50 percent of the area of the outer portion of the arch bar, but not to the outside or exposed edge. In addition to the lateral fracture, there was a longitudinal fissure parallel with and approximately 5/8 inch below the upper surface of the arch bar; the exposed portion of this fissure extended at the inner side of the arch bar approximately 3 7/8 inches from the column bolt hole longitudinally beneath the spring plank. This section of arch bar was easily divided by use of a wedge into horizontal portions which were found to be badly laminated, and the entire longitudinal fissure thus exposed was badly oxidized. The damaged truck was badly broken up and distorted in various ways. A crack was noted in the top arch bar on the same side and end of the truck from which the section of the bottom arch bar had been cut out; this was an old crack extending from the end box bolt hole, diagonally to the end of the arch bar on the under side. No other old defects were noted.

Inspection of the track by the Commission's inspectors disclosed the first indication of derailment to be an abrasion on the head of the rail at the facing-point cross-over switch leading from the east-bound main track to the west-bound main track and thence to the west leg of the wye; this mark was 12 feet east of the facing-point cross-over switch. This mark, which gradually became more pronounced, extended for a distance of 18 feet eastward and then the first wheelmarks appeared on the tieplates, angle bars and ties. At the frog of the trailing-point switch of a stub-end siding located on the south side of the tracks, 540 feet east of the initial point of derailment, there was evidence of violent contact by the derailed truck with the frog and guard rail, and a pair of wheels was torn out of the derailed truck. From this point eastward tothe bridge the track was badly torn up. The condition of track in the vicinity of the point of accident was not a contributing cause of the accident, while the facing-point cross-over switch was carefully examined and found to be in good condition.

The records of the chief of motive power and equipment, as of November 12, 1935, indicated that the Baltimore & Ohio Railroad owned or controlled 87,107 freight cars to be continued in service, and that 33,495 or about 38 percent of these cars, were equipped with arch-bar trucks. During the period from January 1 to November 12, 1935, the arch-bar trucks of 523 cars were changed to trucks with cast steel side frames, and of this number, the trucks of 92 cars were changed in the first 11 days of November. The records also indicated that from January 1, to and including November 13, 1935, there had been 38 derailments on this road due to failure of arch-bar trucks, 1 of these involving the failure of a truck under a locomotive tender; a few of the trucks involved were trucks of the Washburn type. Of these

truck failures, 32 were reported as due to broken arch bars, 3 to broken tie bars, and 5 to defective or missing nuts or bolts, defective material being assigned as a contributory cause in at least 3 instances. Thirteen of these 38 derailments, or approximately 34 percent, were reported as due to defects not visible by inspection without dismantling the truck. Exclusive of damage to lading, the estimated damage caused by these truck failures amounted to $73,209.93. During the period from January 1 to October 31, 1935, this railroad removed 750 defective arch bars; no record of costs was available.

## Discussion

The evidence disclosed that B.C.& G. steel hopper car 1625, loaded with coal, was received by the Baltimore & Ohio Railroad from the Buffalo Creek & Gauley Railroad at Dundon, W.Va., on October 30, and on October 31 it received a class "A" inspection, after which a loaded car certification card, Form 1157, was tacked on it, indicating that it was safe to move to its destination, Jersey City, N.J., nearly 600 miles without further class "A" inspection or being stopped for old defects before being unloaded. From the point at which the car was received to the point of accident the car moved more than 500 miles, receiving class "C" inspection, covering general observation from the ground to find any existing safety appliance defects, check lading, open loads, clearance, etc., at Gassaway and Grafton, W.Va., and Cumberland and Brunswick, Md. The car remained at Brunswick, the last point at which class "C" inspection was received, from 6:50 a.m. to 4:56 p.m., November 4, when it departed in Extra 4488 on the trip in question and while passing through Frederick Junction, 17.5 miles beyond, the rear truck collapsed due to a fracture in the lower arch bar at the column bolt hole nearest the R-4 journal location, north side, A-end, precipitating the derailment.

Undoubtedly the arch bar causing this accident was defective when the car was received at Dundon, but this condition was not discovered by the class "A" inspection, apparently due to the nature of the old break. The weaknesses of arch-bar trucks have been pointed out repeatedly in previous accident investigation reports issued by this Bureau. This railroad, on November 12, 1935, had 33,495 freight cars to be continued in service which were equipped with arch-bar trucks; arch-bar trucks have been changed on only 525 cars between January 1 and November 12, whereas in order for this carrier to complete the change prior to the expiration of the time limit, January 1, 1938, for interchange of freight cars equipped with arch-bar trucks, it will be necessary to make an average change per month of more than 1,300 cars.

## Conclusion

This accident was caused by a broken arch bar.

## Recommendations

The recommendations made in previous reports are hereby repeated:

1. That arch-bar trucks be removed from service at the earliest practicable date.

2. That until arch-bar trucks can be eliminated from service, a reduction sufficient to guarantee safety of operation should be made in the permissible load limit on cars equipped with such trucks.

3. That inflammables, explosives or other dangerous articles should not be transported in cars which are quipped with arch-bar trucks.

4. That provision be made in interchange rules whereby a receiving line may refuse to accept from a connecting line any car equipped with arch-bar trucks.

Respectfully submitted,

W. J. PATTERSON,

Director.