

BUREAU OF SAFETY

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REPORT NO. 2007

Railroad: Pennsylvania Railroad  
Date: September 6, 1935  
Location: Felton, Del.  
Kind of accident: Derailment  
Train involved: Freight  
Train number: Extra North  
Engine number: 1390  
Consist: 68 cars  
Speed: 6-12 m.p.h.  
Track: Tangent  
Weather: Dark and raining  
Time: 4:55 a.m.  
Casualties: 3 killed and 1 injured  
Cause: Washout.

## INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY CONCERNING  
AN ACCIDENT ON THE PENNSYLVANIA RAILROAD NEAR FELTON,  
DEL., ON SEPTEMBER 6, 1935.

October 29, 1935.

To the Commission:

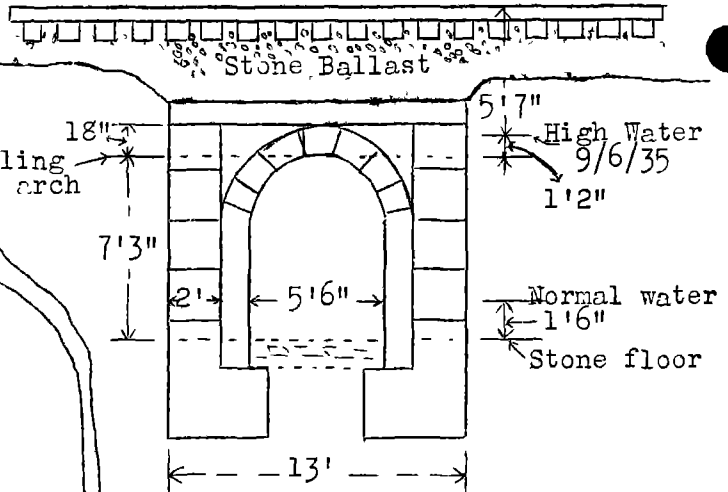
On September 6, 1935, there was a derailment of a freight train on the Pennsylvania Railroad near Felton, Del., which resulted in the death of 3 employees and the injury of 1 employee.

## Location and method of operation

This accident occurred on the Delmarva Division, which extends between Cape Charles, Va., and Canal, Del., a distance of 174.4 miles; in the vicinity of 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 accident occurred on the north-bound main track at culvert 59.82, located 1.52 miles south of Felton; approaching this point from the south, there is a 30' curve to the right 1,363 feet in length, followed by tangent track extending 1,095 feet to the point of accident and for a distance of 8.45 miles beyond that point. The grade for north-bound trains is 0.11 percent ascending at the point of accident. The north-bound and south-bound tracks are laid with 130 and 100-pound rails, respectively, 33 feet in length, with an average of 19 treated ties to the rail length, and are single-spiked, tieplated, and ballasted with 18 inches of rock on top of 12 inches of cinders; the tracks were well maintained. In the vicinity of the point of accident the track extends along a sand and gravel fill 950 feet in length, which at the point of the accident was about 15 feet in height, 36 feet in width at the top and about 67 feet in width at the base.

Culvert 59.82 made an opening for a small stream known as Fantail Branch, which in normal condition is about 2 feet deep and  $5\frac{1}{2}$  to 6 feet wide, and flows under the fill from west to east. This was an arch culvert 40 feet in length from end to end of arch, with a stone floor; the inside dimensions were 5 feet 6 inches wide, and 7 feet 3 inches from top of floor to center of ceiling. The arch was supported on the west or intake end by cut-stone stepped wing-walls 2 feet in thickness which extended 10 feet west from the face of

Fantail Branch



Elevation of Culvert  
West side, looking East

Wilmington, Del.

17.9 mi.

Canal,

29.7 mi.

Dover

1.3 mi.

Holliday,

9.4 mi.

Felton, Del.

(Point of accident)

6.1 mi.

Harrington, Del.

127.9 mi.

Cape Charles, Va.

1,095 ft.

P.T.



Inv. No. 2007  
Pennsylvania Railroad  
Felton, Del.  
Sept. 6, 1935

and parallel with the line of flow through the arch, and on the east end by a rubble stone head-wall 2 feet thick, 14 feet high, and 30 feet in length constructed flush with the face of the arch or at right angles with the line of flow. In the vicinity of the culvert the bank was not protected by rip-rap.

A storm of unusual intensity had prevailed for some time prior to the accident, with very heavy rainfall during the night, and it was still raining, and dark, at the time of the accident, which occurred at 4:55 a.m.

#### Description

Extra 1390, a north-bound freight train, consisted of 66 cars, a deadhead caboose and a working caboose, hauled by engine 1390, and was in charge of Conductor Culver and Engineman Simpler. This train left Harrington, 6.10 miles south of Felton, at 4:40 a.m., according to the train sheet, and was derailed by a washout at culvert 59.82 while traveling at a speed estimated to have been from 6 to 12 miles per hour.

Engine 1390 stopped upright, in line with the track, in the hole caused by the washout, with the rear end of the fire-box resting approximately at the center line and on the debris of the collapsed culvert. The tender stopped in reversed position lying on its side to the west of and parallel with the engine. The first four cars and the forward truck of the fifth car were derailed. The employees killed were the engineman, fireman, and the head brakeman, and the employee injured was the conductor.

#### Summary of evidence

Conductor Culver stated that it was raining very hard when he reported at Delmar, 39 miles south of Felton, at 10:15 p.m., September 5. The brakes were tested and reported working properly, and when departing about 2:15 a.m., September 6, it was still raining. He rode on the engine from Delmar to Seaford, which is 25.9 miles south of Felton, and noted that Engineman Simpler, Fireman Lane, and Brakeman Williamson were in normal condition. Leaving Seaford about 3:05 a.m., it was raining very hard and he went back to the caboose. Before arriving at Harrington a constant heavy rain was falling; a stop was made at that point from about 4:12 to 4:37 a.m., and during this time and after leaving there the heavy rain continued, but it did not cause him to be alarmed as to the

safety of the track. Proceeding north of Harrington at a speed of about 12 miles per hour he was on the rear platform of the caboose but did not see any water in the vicinity of the rails and went inside. Shortly afterwards the flagman came inside the caboose and reported that everything looked all right and at this time the accident occurred; he had not felt a prior application of the brakes and he did not think the train was running much faster than when he was out on the caboose platform leaving Harrington.

Flagman Truitt stated that it rained hard at Seaford and during the stop at Harrington the rain was falling in a terrific downpour, and he did not think it possible for it to rain harder than it was when leaving that point. He had been out on the rear platform of the caboose to make observations and had just returned inside when the derailment occurred, prior to which time the speed of the train had been between 6 and 10 miles per hour; at this time it was still raining, and he had not noticed any prior application of the brakes.

Enginehouse Foreman Patterson stated that on arrival at Harrington with the wreck train at about 9 a.m. September 6, he was notified that he could not proceed farther because of a washout south of the wrecked train, which had occurred subsequent to the accident. He arrived at the point of accident by truck about 1:30 p.m. and on making an inspection of the engine he found both brake valves to be in running position, the throttle about one-half open, with the throttle quadrant broken off, and the air-reverse gear in full forward position.

Statements made by the crews of various trains passing the point of accident within a period of approximately 12 hours prior to its occurrence developed that Engineman Castle, of Train No. 450, which passed culvert 59.82 about 4:36 p.m., September 5, noticed that the water was running rapidly through the culvert and apparently was still rising, and on arrival at Dover, 10.7 miles north of Felton, he called the operator at Holliday, 9.4 miles north of Felton, in order to report the matter to the dispatcher, suggesting that some one should examine the conditions. Dispatcher Wise, on duty at the time, immediately sent a message to the crew of Train No. 463, south-bound, to pass culvert 59.82 slowly and to report conditions on reaching Harrington, and he also sent similar instructions to the crew of Train No. 468, north-bound, who were to report to him from Felton. On reaching Harrington at 5:38 p.m. the crew of Train No. 463 were met by Track Supervisor Heims and the engineman told him there was a lot of water passing through the culvert but nothing dangerous,

while the conductor reported to the operator that water was rushing through the culvert but was not dangerous at that time. On the other hand, however, the crew of Train No. 468, which departed from Harrington at 5:30 p.m., thought conditions somewhat dangerous and Engineman Mock of that train said he reported that the water seemed to be backing up and that the culvert did not appear to be taking it away, while Conductor Messick noticed similar conditions together with some swirling of the water on the intake side and when reporting at Felton he suggested that speed restrictions be placed in effect. In view of these conflicting reports, Dispatcher Wise had the operators at Harrington and Holliday place their block signals at stop and lock them in that position until further investigation could be made and then called Supervisor Heims and was informed that a track foreman already had been sent out to make an examination. At 6:22 p.m. the dispatcher received word from the track supervisor that the tracks were safe for normal speed and that the track supervisor would keep him posted of any dangerous condition. Several other trains passed over culvert 59.82 subsequent to the passage of Trains Nos. 463 and 468 and prior to the occurrence of the accident, the last train being Train D-26, which passed north-bound about 3:30 a.m., according to Engineman Kohlbecker, but no alarming conditions were noted, while the dispatcher said he had heard nothing further from the track supervisor before going off duty at 11 p.m. and the dispatcher who relieved him did not hear of any high-water conditions between Harrington and Felton until about 6:20 a.m., when he was notified of the occurrence of the accident.

Track Foreman Price, who was in charge of the section on which the accident occurred, stated that it was raining September 5, when he completed the day's work at 3:30 p.m., but not sufficiently hard for him to think it necessary to patrol the track. About 5 p.m., however, he was called by Assistant Supervisor Manion to make an inspection at culvert 59.82, and on arriving there by automobile between 5:45 and 6 p.m. he found that the water was about 5 feet from the ceiling of the arch on the west side, and lower on the east side; there was no evidence of any scouring, and the water condition in the wooded section north of the culvert was not dangerous. He returned to Harrington, arriving there about 7 p.m., and reported to Track Supervisor Heims and then went to his home. About 9 p.m. he returned to culvert 59.82 on instructions from Track Supervisor Heims, accompanied by Assistant Supervisor Manion, arriving about 9:30 p.m. and he found the water was backing up, but not swirling, and about 12 or 14 inches from the top of the arch on the west side, and about 4 feet from the top of the arch on the east side; he did not consider the rise

of approximately 4 feet since the 6 p.m. inspection as creating a dangerous condition as the water had been higher at times in the past without doing damage. After this inspection they returned to Harrington, arriving there shortly after 10 p.m., and reported to Track Supervisor Heims, who then instructed Track Foreman Price to call Track Foreman Taylor, of the next section to the south, and about 12:30 a.m. Foremen Price and Taylor proceeded to culvert 59.82, arriving there about 1 a.m. and found the water on the west side approximately 22 to 24 inches from the ceiling of the arch and still lower on the east side, a drop of approximately 12 inches as compared with the 10 p.m. inspection. During the time of this inspection Train No. 449 passed and it was noted then that the culvert was solid, while there was no evidence of any cutting or erosion of the banks. Foremen Price and Taylor returned to Harrington and reported to Track Supervisor Heims that the culvert was perfectly solid. About 4 a.m. Track Foreman Price decided to return to culvert 59.82, but was delayed en route and had reached a point about one-half mile from Harrington when he met Flagman Truitt, of the wrecked train, who was on his way to report the accident. Foreman Price stated further that in 1926 the water had been up within half an inch of the top of the arch, but no damage occurred at that time nor at other times of high water in the past.

Track Foreman Taylor said that on arriving at the culvert with Track Foreman Price they found that the current was headed straight through the culvert and running freely, with no back-water swirl, neither was there any evidence of scouring or cutting into the fill on either side of the culvert, and had he been in charge he would not have considered it necessary to place any speed restrictions or station a watchman at that point. Foreman Taylor further stated that he had never seen it rain harder than it did between the hours of 3:45 and 4:45 a.m., at which time he was on the south end of his section.

Assistant Track Supervisor Manion corroborated the statements of Track Foreman Price as to conditions at the time of the second inspection, while Track Supervisor Heims said that comparison of the report of the third inspection with the report of the second inspection indicated that the water was falling and that there was no further danger of high water at that time, and due to the fact that the water had not been to the top of the culvert at any time, and was receding, he did not think that a watchman should have been stationed there. Between the hours of 9 p.m., September 5, and 5 a.m., September 6, he was at the telephone switchboard in Harrington keeping in touch with track conditions; the rainfall between the hours of 10 p.m.

and 5 a.m. was heaviest about midnight but at no time was sufficient to cause alarm as to a possible washout between Harrington and Felton, nor was it sufficiently abnormal to require a track patrolman between these points, although he had instructed Track Foreman Price to make another inspection at culvert 59.82 about 4 a.m. merely as a precaution. Track Supervisor Heims further stated that two other washouts occurred after the time of the accident, one about 90 feet in length approximately nine-tenths of a mile south of culvert 59.82, and the second about 45 feet in length  $6\frac{1}{2}$  miles north of this culvert, both of which prevented wrecking equipment from reaching the scene of the accident.

Bridge Inspector Pryor stated that culvert 59.82 was an arch culvert built in 1901, the portion of the roadbed just above the arch being filled in with small stone and gravel before the dirt fill was added, and no repairs had been necessary to his knowledge since 1904. The culvert had been subjected to a regular bi-monthly inspection since he was made bridge inspector in August, 1935. There had existed for many years a crack in the crown of the arch from 1 to  $1\frac{1}{2}$  inches wide and 18 inches deep, beginning 2 feet 8 inches from the east end, and in addition in May or June, 1935, a small stone about 5 inches in diameter had fallen out of the crown of the arch on the east end, but after a careful inspection this was not thought to be a serious matter; otherwise no change was noted from any previous inspections. After the unusual storm conditions in August, 1933, a detailed inspection of all bridges was made, and during that inspection he made a thorough examination of culvert 59.82 and high-water marks indicated that the water had been 3 feet 2 inches from the top of the arch at that time. He also had probed around the footings, but found no traces of scouring at any point, and no evidence of washing of the banks of the fill at either side of the intake; in fact, there had been no washing of the banks on that side since he had been a bridge inspector, nor had he ever known of any washouts or high water at this culvert. He also stated that at the time of the last bi-monthly inspection, on August 16, 1935, he waded through the culvert and thoroughly examined the floor, arch, and wing walls, and probed around the footings, but found no signs of erosion or scouring at any of these points. After the accident he made an inspection in detail and was of the opinion that the bank of the fill had been scoured by water on the north side of the north-west wing wall, the water cutting away the fill, which gave way under the front of the engine.



Division Engineer Vandling stated that he was in the office of Track Supervisor Heims when a report came from the train dispatcher indicating high water  $1\frac{1}{2}$  miles south of Felton, and he heard instructions issued to Track Foreman Price to make an immediate inspection. He then left for Delmar and on his arrival there he talked with the track supervisor on the telephone and was advised that Track Foreman Price had reported that the culvert was not running full and that the water was not high enough to cause concern. In the morning he proceeded to the point of accident, and he estimated the washed out area as being 135 feet in length, this washout, in his opinion, being caused by the water rising on the west side of the track and scouring the banks sufficiently to honeycomb the sand fill on both sides of the arch, the fill giving way when engine 1390 ran over it. He further stated that the track foreman was directly responsible for the condition of the track between Harrington and Felton and did not have to get permission of any officer to patrol the track, and that there were sufficient track men available to have manned any point considered dangerous; he was of the opinion that all reasonable precautionary measures had been taken to guard against any possible accident. Since being on the Delmarva Division he had not experienced any such rain extending over so long a period of time. Division Engineer Vandling further stated that during 1934 a survey was made of bridges and culverts where it was considered dams in the watershed area might break and cause a heavy flow of water; consideration also was given to the slope on which the water entering the bridge would travel and the possibility of scouring around the wing walls, and the result of this survey was the placing of rip-rap at many locations, though none was placed at culvert 59.82; at quite a few of the points where rip-rap was placed, washouts occurred during the storm of September 5 and 6. There was no basin or mill pond in the watershed area west or northwest of culvert 59.82, but he had found that the ground is generally low and difficult to drain. According to a map furnished by the United States Geological Survey, the watershed area adjacent to culvert 59.82 approximates 1.5 square miles.

Observations made by the Commission's inspectors indicated that the fill was washed out both north and south of the culvert, but due to the fact that some of it was carried away after the accident occurred because of the damming effect of the engine after it had settled in the hole, and the consequent diversion of water around each end of it, it was impossible to state accurately the size of the washout at the time the accident occurred. Subsequent measurements showed that the water had risen to a point 14

inches above the ceiling of the arch of the culvert and that the fill was washed out for a distance between 35 and 38 feet to the south, and between 65 and 72 feet to the north, of the center line of the culvert.

The official record of the cooperative station of the United States Weather Bureau at Dover, Del., 12.22 miles north of culvert 59.82, showed a precipitation on September 5 and 6 as follows: 8 a.m. to noon, 1.25 inches; noon to 5 p.m., 0.90 inches, and 5 p.m. to 8 a.m., 4.65 inches, or a total for the 24-hour period of 6.80 inches. It also was reported that at Ridgely, Md., which is approximately 16 miles southwest of culvert 59.82, a rainfall of 14.08 inches was recorded from noon, September 4, to 7 a.m. September 6. Local news items indicated that as a result of this storm the territory in this vicinity experienced one of the worst floods in its history, and a map of this territory, furnished by the railroad company, showed the location of high-water damage and washouts at 62 different points, 25 of these being termed of major proportions, and all of them located entirely within the southern portion of the State of Delaware and the northern portion of the Eastern Shore of the State of Maryland, within an area measuring approximately 45 miles from east to west and 75 miles from north to south.

#### Discussion

An unusually heavy rain fell during the night, the heaviest probably being some time between midnight and 5 a.m., which caused the water to rise to a point about 14 inches above the ceiling of the arch, and during this time the banks of the fill honey-combed or scoured in the vicinity of the north side of the arch on the west side of the track, undermining the roadbed and leaving the track unsupported. Two trains running in the same direction as the wrecked train had passed over this culvert within a period of about 2 hours prior to the time the accident occurred, and the crews of these trains noticed no alarming conditions at this point. High water had been reported, however, several hours earlier, and inspections had been made on three occasions during the night, but without developing any condition which appeared to require a watchman. This culvert had been built about 34 years and evidence of employees with service continuously in this territory for more than 30 years indicated there had been no previous trouble during that time due to high water or washouts at this point, the evidence that the heaviest rain came only a very few hours prior to the accident is supported

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by the fact that washouts occurred both north and south of the point of accident shortly after the accident happened.

Conclusion

This accident was caused by a washout due to an unusually heavy rainstorm.

Respectfully submitted,

W. J. PATTERSON,

Director.