INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN RE INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE WABASH RAILWAY NEAR MINEOLA, IOWA, ON JULY 20, 1928.

September 10, 1928.

To the Commission:

On July 20, 1928, there was a derailment of a freight train on the Wabash Railway near Mineola, Iowa, which resulted in the death of four employees.

Location and method of operation

This accident occurred on the Nineteenth District of the Western Division, extending between Omaha, Nebr., and Stanberry, Mo., a distance of 119.3 miles; in the vicinity of the point of accident this is a single-track line over which trains are operated by time-table, train orders and a manual block-signal system. The accident occurred approximately one mile east of Mineola, at bridge No. 1271, spanning a stream known as Lone Tree Creek; approaching this point from the west the track is tangent for a distance of 1,493.2 feet, followed by a 4° curve to the right 1,949.2 feet in length, the western end of bridge 1271 being located on this curve at a point 585.4 feet from its eastern end. The grade for eastbound trains is generally ascending, being 0.46 per cent across bridge 1271. The track in this vicinity is laid with 75-pound rails, 30 feet in length, with about 18 ties to the rail-length, single-spiked and fully tie-plated on curves.

Bridge 1271 was originally a pile-bent trestle 216.1 feet in length and approximately 40 feet above the bed of the creek. It consisted of 15 bents, each bent being made up of 4 piles, and the bents were spaced about 15 feet apart. The chords consisted of three 8 x 16" stringers spaced by 1½" packing spools and fastened together with bolts; the stringers were butted together and connected by corbel blocks, and were secured to the caps of the bents with drift bolts through one end of each outside stringer. The bridge was equipped with inside guard rails and outside guard timbers. During the winter

of 1924-1925 bents Nos. 1, 2, 3, 5, 12, 13, and 14 were replaced with frame bents set on stub ends of the original piling; these bents were secured to the foundation piling by drift bolts, one bolt to each pile. At about the same time longitudinal bracing was applied to the structure between bents Nos. 3 and 13 and were applied diagonally about 3 feet below the caps. In December, 1927, bents Nos. 7, 8, 10, and 11, were replaced in the same manner as those previously mentioned. The west approach to the bridge is on a fill about 125 feet in length and was about 10 feet high at the bulkhead; the east approach was on a fill about 1,000 feet in length and about 18 feet high at the bulkhead.

It was raining at the time of the accident, which occurred at about 1.50 a.m.

Description

Eastbound freight train second No. 94 consisted of 34 cars and a caboose hauled by engines 2154 and 2158, and was in charge of Conductor Smith and Enginemen Tucker and Wilson. This train departed from East Switch, 11.5 miles west of Mineola, at 12.50 a.m., 1 hour and 30 minutes late, and was derailed at bridge 1271 while traveling at a speed estimated to have been about 15 miles per hour. Both engines and the first and second cars were derailed and came to rest at the bottom of the ravine in a badly damaged condition. The head engine fell on its right side, its tender was on its left side immediately behind the engine, the second engine and its tender came to rest on their left sides; the derailed cars were in various positions to the rear of the engines. The employees killed were the enginemen and firemen of both engines.

Summary of evidence

Conductor Smith stated that after departing from East Switch nothing unusual occurred until the train reached a point about 1½ miles west of Mineola when the train was brought to a stop but he did not ascertain for what purpose. Shortly after the train started he noticed brakes sticking on the third or fourth car ahead of the caboose whereupon he applied the brakes by means of the conductor's valve in the caboose and the train again stopped. After the brakes

were released the train proceeded but on account of the heavy grade east of Mineola it had attained a speed of only about 15 miles per hour when it again came to a sudden stop. He left the caboose, went forward and upon reaching Bridge 1271 he discovered that a portion of it had collapsed resulting in both engines and several cars dropping into the ravine. Conductor Smith further stated that a severe rainstorm prevailed before his train departed from East Switch and that it rained at intervals en route. He also said that on previous occasions he had observed section men patrolling the track during heavy rainstorms and on the night of the accident as his train passed Mineola he saw a section gang with a hand car on the side track at that point.

The statements of Brakeman Stafford and Humphrey, who were also riding in the caboose at the time of the accident, corroborated those of Conductor Smith with respect to train performance and weather conditions prior to the accident. They estimated the water to be about 8 or 10 feet in depth in the creek under bridge 1271 at the time they made an examination shortly after the accident occurred.

Conductor Ferriter, of train 1st No. 94, stated that at 10 p.m. on July 19 it rained very hard at Council Bluffs but slackened shortly after that time. His train departed from East Switch at 11.20 p.m., and no heavy rain was encountered until his train reached Mineola, while intermittent showers were encountered after passing that point. His train passed over Bridge 1271 at about 12.25 a.m., at which time a light rain was falling but he noticed no irregularities in the bridge or track. He said that the creek under Bridge 1271 is normally dry although at the time his train passed over it he observed it by a flash of lightning and thought the water was about 2 or 3 feet deep. He also said that while he had encountered heavy showers at various places he felt no apprehension and therefore did not report weather conditions to the dispatcher; on several occasions following storms he had seen section men patrolling the track. The statements of Engineman Scheiner, of the same train, coincided with those of Conductor Ferriter.

Section Foreman Bohlitt, who had charge of the section on which the accident occurred, stated that standing instructions were in effect to patrol the track at any time when it is deemed necessary. He has 6 miles of track to maintain, within which territory there are 6

bridges, and he was allowed 3 laborers for this work. He said threatening storms appeared during the evening of July 19 but at about 11.30 p.m., there were signs of the weather clearing and as a consequence he retired. At about 1 a.m., he heard it raining pretty hard and as a result he arose, called his crew and started to patrol the track. He first proceeded eastward to Bridge 1272, which is located approximately 3,400 feet west of Bridge 1271, both bridges spanning the same stream and in addition the water from another creek flows under Bridge 1272. He said that during severe storms debris collects under the latter bridge but at the time he inspected it only a small amount of drift had collected, and as he had never experienced any trouble with Bridge 1271, coupled with the fact that Bridge 1272 carries off a much greater amount of water in a narrower channel he decided to return to a bridge about 3/4 mile west of Mineola where trouble is more frequently experienced from high water. As no alarming conditions prevailedat this point he returned to Mineola at which point he was located when train second No. 94 passed. Upon learning of the accident he went directly to that point and found about 10 or 12 feet of water in the channel and about 5 feet of debris on the upstream side of the bridge. He further stated that during the night of July 7, 1928, an exceedingly heavy rain fell which caused the creek to rise higher than it did on the night of the accident and at that time he inspected Bridge 1271.

Supervisor of Bridges and Buildings Harriman stated that Bridge 1271 was originally a pile-bent structure but that several of these bents have been replaced by frame bents. When these changes were made the earth was removed from around the piles to a depth where they were found sound at which location they were cut off, the lower portion of the piles which remained in the ground being used for foundations for the new bents. These bents were constructed with 12 x 12" material; the sills were anchored to the piles with drift bolts, the posts, of which there were 4 to each bent, were fastened to the sills with spikes, while the caps were secured to the posts with drift bolts. The stringers were also anchored to the caps with drift bolts. On account of the height of this particular bridge 3 x 10" lateral bracing had been applied, as well as some additional stringers, to strengthen it. Shims were found on several of the bents between the caps and the posts on the portion of the bridge which remained intact which he said were installed at the time the bridge was con-

structed due to the caps being low when they were put in place and were not put in subsequently due to the bridge settling. He had never known of a post or bent of this bridge forced out of its normal position from either the current of the water or debris prior to the date of the accident. He said about 10 days previous to the accident a heavy windstorm broke many branches from the trees along the water course on the upstream side of this bridge and it was his opinion that these branches together with other debris gathered against the bridge and this weight with a large volume of water against it forced one of the bents off its foundation and from its place in the superstructure thus leading to the collapse of the bridge when the train started across it in its weakened condition.

Bridge and Building Inspector Delapp stated that he last inspected Bridge 1271 on July 16 and at that time he found the surface and alinement in good condition, although he found bent No. 4 was in such shape that it needed renewing; he did not think this defective condition had any effect on the failure of the bridge as this bent was located a considerable distance east of the first indication of collapse. He had taken observations of the bridge while trains were passing over it and had never seen any lateral motion although there appeared to be a slight vertical deflection. He examined a bent which came out of the bridge and was washed a considerable distance down stream. This bent was found to be in good condition with four drift bolts which had anchored the sill to its foundation still in the sill. He further stated that the sills of bents 10 and 11 were never under the ground as the piles were cut as low as the water would permit at the time the bents were installed. He did not think any portion of the train was derailed before it reached the bridge and he was of the impression that the bent he examined, found some distance away, which apparently was bent No. 10, was displaced by pressure from heavy drift in the stream.

Bridge Inspector Sercomb stated that he made a general inspection of Bridge 1271 on July 13 and at that time found nothing unusual, no material repairs having been made since his last previous inspection at which time all of the material was found to be sound. He thought the bent found down the stream was bent No. 10 and he believed it had been washed out by high water and debris prior to the arrival of the train involved

in the accident which weakened the structure to such an extent that it failed to support the train.

Chief Bridge Engineer Johnson stated that the heaviest engines permitted on the district on which the accident occurred were of the class I-2 type, the same as those involved in the accident. These engines have a 16-foot wheel-base with a maximum weight on drivers of 154,500 pounds. He was of the opinion that Bridge 1271 was not the weakest one on the district. Some of the piles were found broken after the accident but he did not think this was due to an overload but was apparently the result of strain upon them during progress of collapse. It was his impression that the bent which was washed down stream was displaced before the train involved started across the bridge, basing this impression on the fact that it was not marred in any manner and also because if it had been displaced at the time the bridge fell it presumably would have remained with the debris of the structure.

Assistant Division Engineer Lewis stated he examined the foundation piles which were used in rebuilding the bridge and found them to be in good condition. He also examined the bent found some distance from the bridge but could not determine its original position in the structure. Four drift bolts were found in the sill the heads of which were imbedded in the sill while the protruding ends of three of them were bent in one direction and the fourth, which was in one end of the sill, was bent in the opposite direction which indicated that the bent was forced out of its position. The cap was secured to the posts with one drift bolt to each post. Two bolt holes about 3 inches deep appeared in the cap indicating that it had been secured to the stringers with only two bolts while according to standards four should have been used. He said the shims found in the caps of the remaining part of the bridge were necessary to level the track but did not know what necessitated such leveling. The position of the rail anchors in the vicinity disclosed that the track had been creeping slightly to the eastward.

An examination of Bridge 1271 by the Commission's inspectors subsequent to the accident revealed that it collapsed between bents 9 and 3, bent 9 being located west of bent 3. Shims were found between the caps and posts which varied from $\frac{1}{2}$ to 2 inches in thickness on all

of the bents which remained standing; it could not be determined whether shims had been used on the destroyed bents. Several of the piles which were broken off at their ground lines were materially deteriorated but it is believed they were broken off due to the strain during the process of collapse rather than because of their defective condition. The bolts through the sill of the bent found about one mile below the point of accident were numbered, which numbers corresponded with numbers found on the foundation piles of bent No. 10, and measurements taken of this bent proved conclusively that it had been bent No. 10 in Bridge 1271. These bolts protruded through the sill for distances varying from 5 to 12 inches; the bolts were bent and paralleled the sill while the bolt holes were elongated in the same direction indicating that the bent moved off its foundation under strain from the up-stream side. Distinct imprints of 4 piles were found on the bottom side of the sill which is evident that the sill rested on this number of piles. Inspection of the piles under bent 10 disclosed that one pile was out of line and another could not be found but these piles may have been displaced as a result of the accident as they were buried under a large amount of wreckage. The tops of these piles appeared to be serviceably sound although one of them showed considerable deterioration at its circumference. An inspection was also made to ascertain the amount of drift that was left along the stream subsequent to the accident. A considerable amount was found on high ground that was left by the water as it receded apparently very rapidly. A large amount of debris was also found against the bents of a highway bridge which spans the creek above Bridge 1271 while a similar amount was lodged against Bridge 1272.

Conclusions

This accident was caused by Bridge 1271 having been weakened, due to high water, to such an extent that it collapsed under the weight of train second No. 94.

Bridge 1271 was originally a pile-bent trestle but during the past 4 years several of these bents had been replaced by frame bents. The foundation used for the frame bents were the original piles cut off near the surface of the earth or at a point where they were found to be sound, the bents being anchored to the piles by the use of drift bolts.

The evidence indicated that during the night of July 19 a considerable amount of rain fell in the vicinity of the point of accident and that certain bridges had been inspected by the section crew but that no inspection was made of Bridge 1271, while at the time train first No. 94 passed that point at about 12.25 a.m., nothing unusual was observed by the crew of that train. Immediately after the accident, however, about 10 or 12 feet of water was found in the channel and considerable drift was found on the upstream side of the bridge.

An examination of the bridge subsequent to the accident disclosed that the bridge collapsed between bents 9 and 3, leaving the balance of the structure intact and which appeared to be in fairly good condition. Shims were found between the caps and posts on all of the bents but, according to the statements of Supervisor of Bridges and Buildings Harriman, these were applied at the time the bridge was constructed for the purpose of leveling the caps after the piles were driven. An examination of the piles that were broken off under the collapsed portion of the bridge revealed that they were somewhat deteriorated but it did not appear that this condition was a contributing factor in the failure of the bridge. One of the bents was found intact about a mile from the point of accident and it was identified as bent No. 10 in Bridge 1271. The bolts through the sill were bent almost flush with and parallel to the sill which indicated that this bent had been forced from its base by pressure which was apparently caused by an accumulation of drift lodging against this bent and water collecting behind it. Whether this bent had become completely displaced prior to the arrival of train second No. 94 or whether it finally failed when the train passed over it could not be determined.

Section Foreman Bobbitt stated that he did not inspect Bridge 1271 during the night of the accident due to the fact that trouble had never been experienced at this point before as well as his apprehension of a bridge west of Mineola where trouble had been experienced by drift accumulating. Had he properly inspected Bridge 1271 immediately after inspecting Bridge 1272 it is possible that he would have found conditions existing that would have prompted him to take necessary action in order to have prevented the accident.

The employees involved were experienced men and at the time of the accident none of them had been on duty in violation of any of the provisions of the hours of service law.

Respectfully submitted,

W. P. BORLAND,
Director.