

INTERSTATE COMMERCE COMMISSION

REPORT OF THE DIRECTOR OF THE BUREAU OF SAFETY IN THE
INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE
ST. LOUIS-SAN FRANCISCO RAILWAY NEAR NASH, MO., ON
MARCH 29, 1928.

April 30, 1928.

To the Commission:

On March 29, 1928, two freight trains were derailed on the St. Louis-San Francisco Railway near Nash, Mo., resulting in the death of two employees, and the injury of one employee and one other person.

Location and method of operation

This accident occurred on the St. Louis Sub-division of the River Division, extending between St. Louis and Chaffee, Mo., a distance of 143.6 miles, in the vicinity of the point of accident this is a single-track line over which trains are operated by time-table and train orders, no block-signal system being in use. The accident occurred at bridge T-137.8, located approximately $1\frac{1}{2}$ miles north of Nash, approaching this point from either direction the track is tangent for more than one mile, while the grade is practically level until either approach to the bridge is reached, then the approaches rise at the rate of 1 per cent. The rise of the north approach starts at a point 2,300 feet north of the bridge and the rise of the south approach starts at a point 2,757 feet south of the bridge, the grade across the steel span being level. The track in this vicinity is laid with 90-pound rails, 33 feet in length, with about 20 ties to the rail-length, the track is well maintained.

Bridge T-137.8, spanning the Diversion Channel, Little River Drainage District, was 146.4 feet in length and was composed of one steel, through, pin-connected truss-span, 144 feet in length, each end of the span resting on a concrete pier, there were 133 feet of standard pile trestle approach on the south end and 803 feet of standard pile trestle approach on the north end. The span was about 20 feet above the water, which flows under the bridge from west to east. The steel span was fabricated in 1900 and was erected on another division where it remained in service until 1916, then it was removed and placed in storage until 1918, when it was placed in service at the point of accident, at first it was erected on cluster piles but in 1924 it was placed on permanent concrete piers.

The weather was clear at the time of the accident, the first derailment occurred at about 4.30 a. m., and the second at about 6.57 a. m.

Description

Southbound freight train extra 4013, carrying a tractor derrick on a flat car, collided with and injured the end batter post of bridge T-137.8 by reason of shift of position of the derrick, the bridge thus damaged collapsed under northbound freight train extra 4023.

Southbound freight train extra 4013 consisted of 39 cars and a caboose, hauled by engine 4012, and was in charge of Conductor Holland and Engineman Rice. This train left Cape Girardeau, 7.9 miles north of Nash, at 3.55 a. m., and while crossing bridge T-137.8 at a speed of about 2 or 3 miles per hour the upper or revolving part of a tractor derrick loaded on the eight car ahead of the caboose shifted to such an extent that it struck the southwest batter-post of the bridge, derailing the car. The body of the flat car and the tractor derrick dropped to the ground, off the trestle approach immediately south of the span, but the trucks of the car remained on the bridge.

Northbound freight train extra 4023 consisted of 64 cars and a caboose, hauled by engine 4023, and was in charge of Conductor Marsh and Engineman Lynch. After the track on the bridge had been cleared this train left Nash at about 6.52 a. m., and was derailed as a result of collapse of bridge T-137.8, while traveling at a speed of about 5 miles per hour. Engine 4023 and its tender were precipitated into the bed of the channel and came to rest on their left sides, partially submerged in the water and enmeshed in the truss work of the span, the first car in the train also came to rest on its left side, immediately north of the south pier. The employees killed were the engineman and head brakeman of extra 4023.

Inspection of the bridge after its collapse disclosed that the southwest batter-post had been struck and bent. The jaw plates were broken out at each end, the top side of the cover plate was straight but the webs were bulged at the bottom side where the post was struck, apparently by the southbound train. There was another bulge in the bottom of the post, but this bulge bore a white mark and was evidently caused by the post striking the corner of the concrete pier when the span collapsed. The south end of the span came to rest about 10 feet west of its original location on the pier, the span apparently rotated about the bottom chord of the east truss. The truss struts and stringers at the north pier were only slightly displaced. The failure

was confined entirely to the steel span and there was no displacement of any nature in the trestle approaches or the concrete piers.

Summary of evidence

Conductor Holland, of extra 4012, stated that before leaving St. Louis he made no inspection of the manner in which the tractor derrick was loaded and secured, but between St. Louis and Cape Girardeau, a distance of 131.3 miles, he inspected it at four points and noticed nothing wrong. However, inspection at Cape Girardeau disclosed that while the caterpillar treads of the derrick were in proper place and firmly blocked on the flat car, the upper or revolving part of the derrick had shifted about 12 or 13 inches beyond the outside of the car, the wire cables which were provided to prevent this part of the derrick from shifting were stretched tight and Conductor Holland did not see any chance of further shifting. He thought the derrick would clear bridge T-137.3 but arranged with the engineer to proceed over it at low speed. He also talked to Head Brakeman Bond and Flagman Featherstone about this matter and before proceeding over the bridge the flagman, carrying a lighted fusee, stationed himself on the top of the car immediately behind the derrick, while the conductor stood on the rear of the caboose with one hand on the angle cock. While crossing the bridge the speed of the train was about 2 or 3 miles per hour, the flagman giving proceed signals with the lighted fusee. The tractor derrick cleared the superstructure of the bridge until it had nearly crossed, then the brakes were released from the head end of the train, the slack ran out, the shifted load struck the end-post of the bridge, the flagman gave a stop signal with the fusee and the conductor opened the angle cock on the caboose, applying the brakes. Conductor Holland said the train ran about one car-length after the derrick struck the bridge. With the exception of the flat car none of the equipment was derailed and the caboose and the seven cars ahead of it remained on the span and the north trestle approach. After the accident that part of the train ahead of the flat car involved was moved south to Chaffee and on arrival at that point the conductor requested that the general foreman of bridges and buildings inspect the bridge. When the wrecker reached the point of accident the trucks of the flat car were picked up, then the wrecker coupled to the seven rear cars and pulled them southward across the bridge. The conductor said that neither the wrecker nor its engine went out upon the steel span while clearing the track. Conductor Holland further stated that after the accident, on his return from Chaffee, he walked over the tops of the seven rear cars inspecting the bridge and he did not think

that the batter-post where it was struck was bent more than one inch. The track was slightly out of line. Flagman Featherstone said that when the revolving part of the derrick struck the southwst batter-post of the span he immediately gave stop signals and the train was quickly stopped. He then went back to flag.

Engineman Rice, of extra 4012, stated that at Cape Girardeau he was informed of the shifting of the tractor derrick and was told to reduce speed over this bridge as a matter of precaution. The speed was reduced accordingly, the train being just barely kept moving as the flat car reached the bridge, and on account of the descending grade of the south approach to the span the independent engine brake was applied to keep the train slack bunched. Engineman Rice watched closely for signals from the lighted fusse held by the flagman at the rear of the train. When the train was almost over the bridge Engineman Rice said Head Brakeman Bond remarked that the flagman was giving a proceed signal but the engineman said he did not think so, he released the independent engine brake, continuing to look back, and just as he did so he saw fire fly and then applied the air brakes in emergency. Engineman Rice said that he did not see any stop signal given by the flagman, and he thought that the slack had partly run out of the train after the independent engine brake was released. The air brakes worked properly on route and smooth stops and starts were made. Engineman Rice noticed nothing unusual about the bridge when his engine passed over it, he did not make any inspection of the bridge after the accident. Statements of Fireman Finley and Head Brakeman Bond corroborated in substance those of Engineman Rice.

Fireman Robinson, of extra 4033, was interrogated at the hospital four days after the accident, he said that after getting on the steel span, traveling at a speed of about 4 or 5 miles per hour, his engine appeared to swerve at the rear and then it fell with the bridge. In the immediate vicinity of the point of accident the track was slightly out of line. Conductor Mearns and Flagman Capshaw were riding on the caboose when the train came to a sudden stop and were unaware of anything wrong prior to the accident.

General Foreman of Bridges and Buildings Brooke stated that after the first derailment he proceeded to the bridge on the derrick and made an inspection of the bridge. He walked under the bridge on a sand bar but noticed nothing wrong, then he climbed over the overturned flat car, one end of which was leaning against the south pier, he looked at the floor beams and connections then worked to the north end of the bridge and back to the center. When the rear cars of extra 4012 were pulled off the bridge he inspected the track for any weakness or irregularities in line and surface. At a point about 18 feet south of

the span the track was slightly out of line. He then inspected the top chord of the bridge and the only damage he saw was that two lateral tie rods, one inch square, were broken in two at the south end of the span and the southwest batter-post was bent about 2 or 2½ inches on the inside corner, at a point about 7 feet above the base of the rails. Foreman Brooke said that while he did not have any technical knowledge of steel bridge work he did have considerable practical experience covering a period of 28 years, and that he had been serving in his present capacity for the past 20 years, he made that he considered a very critical examination of the bridge. On arrival of extra 4023 at the bridge he gave the engineer a slow signal and the train proceeded upon the bridge at a speed of about 4 miles per hour, then the bridge collapsed under the weight of the engine. He could give no reason for the failure of the bridge. He stated that the batter-posts at each end of the bridge had the same clearance and as the derrick crossed the entire bridge until the batter-post at the far end of the span was reached it was evident that further shifting of loading occurred while the flat car was on the span, he inspected the running gear and trucks of the flat car but found nothing wrong with them.

Bridge Engineer Miller stated that he had made a detailed inspection of bridge T-137.3 on December 16, 1927, and a superficial inspection on March 19, 1928, and on both of these occasions noticed nothing unusual. He reached the scene of the accident during the afternoon of the day of its occurrence and examined the bridge in its collapsed state. The inside channel of the bottom chord at the south end of the east truss was fractured, partly bent and then broken off, this was a square break, evidently caused by the fall of the bridge, this was a tension member and not subject to bending in the bridge. One of the top lateral rods was pulled in two and showed elongation and cup fracture, indicating good metal. Otherwise he found no breaks and there was nothing to indicate poor metal or that the material had deteriorated from long usage or overstrain. The position of the wreckage indicated that the west truss failed and that the east truss held long enough to throw the wreckage to the west. The south end of the bridge apparently gave way first as the span was 8 or 10 feet north of its original position. The bridge remained together in falling with the exception of the southwest batter-post, which fell as a separate piece. The only way it could have been definitely determined what load the span would carry after the first accident was to have used a testing machine, otherwise it was merely a matter of judgment. Bridge Engineer Miller advanced as an explanation of the failure of the bridge the opinion that the bottom flanges of the batter-post were bent by the blow from the

tractor derrick and then buckled further under the weight of engine 4023 this caused the batter-post to bow upward until it reached a position where its ends were pried off the pins and the end jaw plates broke out so fast it was disconnected from the truss.

Chief Engineer Jonah stated that the bridge was amply strong to carry the type of engines used and that for a year it had been in service without sagging under the type of engines involved in this accident. On this occasion the bridge was not loaded to one-half of its permissible loading under the American Railway Engineering Association specifications. In his opinion the bridge was weakened by the blow from the derrick and then collapsed under the weight of engine 4023.

Erecting Engineer Edwards, of the American Hoist and Derrick Co., stated that the hoisting machine was shipped from St. Paul, he saw to the loading of the machine on the flat car and it was secured with blocks. At the back of the machine two 8 x 10 inch joists were placed upright, cross-braced and tied endwise to the cross blocking back of the treads, at each corner of the machine, both front and back, a 5/8 inch cable, doubled, was fastened through the stake holders and then twisted tight, to keep the revolving part of the machine from turning. The turntable brake, at the center pin of the machine, was also set tight. He had never experienced similar trouble with this type of machine.

Car Inspectors Martin and Simpson stated that at St. Louis they marked the flat car "bad order", while the caterpillar-tread blocking was intact, the upright joists securing the revolving part of the machine were tilted slightly and the cross blocking was slightly loose. The cables were fairly tight. They made a critical inspection of this car after it was repaired and while it was in the train made up and ready to depart on the trip in question, as did Car Inspector Detwiler, Repair Track Foreman Foster and Piece Work Checker Stein, and everything about the car, including the lading and the manner in which it was secured, appeared to be in proper condition to proceed. Lead Carman Pate stated that he gave the order for the blocking to be used to secure the load, the blocking was replaced and additional blocking applied, which work he supervised. After completion of this work he said he inspected it carefully and considered it to be in proper condition for the car to be moved safely.

Conclusions

The first derailment was caused by a derrick shifting on a flat car and coming in contact with a batter-post of bridge T-137.8, apparently weakening the span; the second derailment was caused by the collapse of the bridge, thus weakened, under the weight of the engine of another train.

The testimony disclosed that the tractor derrick was first loaded on the flat car at St. Paul, but on arrival at St. Louis it was found the blocking had become loosened. The derrick was reblocked, inspected and again considered properly secured for the car to be moved in safety. En route from that point, however, it was discovered that the upper or revolving part of the derrick had shifted and protruded beyond the side of the flat car about 12 or 13 inches, although the cables appeared to be stretched tight and the conductor thought no further shifting would occur. As a matter of precaution, however, it was decided to move the train across bridge T-137.8 at a low rate of speed. While crossing the bridge the independent engine brake was applied, bunching the slack, and the speed of the train reduced to about 2 or 3 miles per hour. The clearance of the batter posts at each end of the bridge was the same and the derrick cleared the northwest batter-post and the entire superstructure of the bridge until the flat car was almost over the span, when the independent engine brake was released, causing the slack to run out, the shock from which apparently resulted in further shifting of the derrick, which came in contact with the southwest batter-post, derailing the flat car and evidently weakening the span and knocking the track slightly out of line immediately south thereof. An examination of the bridge was afterwards made by the general foreman of bridges and buildings and it was decided that the bridge was safe for the passage of northbound freight train extra 4023, at a low rate of speed. That train proceeded upon the bridge at a speed of about 4 or 5 miles per hour, and the bridge collapsed under the weight of the engine. The general foreman of bridges and buildings made what he considered a very critical examination of the span after the first derailment, he possessed no technical knowledge of steel bridge work, although he had considerable practical experience. Whether the weakened condition of the span was clearly manifest after the first accident, and of a nature so serious that its dangerous condition should have been realized and traffic suspended until proper tests of the bridge were made, is not definitely known.

There appears to be ample evidence that this bridge was in good condition prior to the time of the first derailment. There had been no speed restrictions on the bridge recently, and engines of the same type as the engines involved in this accident had been running over it regularly, in fact, engine 4012, the last engine over the bridge prior to its collapse is of the same type as engine 4023 under which the bridge failed. The engine an of engine 4012 noticed nothing wrong with the bridge when he crossed it less than three hours before its collapse. After the accident the piers on which the span rested were found to be in good condition. Examination of the span after the accident, according to Bridge Engineer Miller, failed to disclose poor metal or indication of deterioration from long use or overstrain.

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Had the derrick/properly secured on the flat car so as to preclude any possibility of shifting, this accident could have been prevented.

All of 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.