

Inv-2286

INTERSTATE COMMERCE COMMISSION
WASHINGTON

REPORT OF THE DIRECTOR
BUREAU OF SAFETY

ACCIDENT ON THE
CHICAGO, ROCK ISLAND & PACIFIC RAILWAY

ALTOONA, IOWA

AUGUST 3, 1938

INVESTIGATION NO. 2286

SUMMARY

Inv-2286

Railway:	Chicago, Rock Island & Pacific
Date:	August 3, 1938
Location:	Altoona, Iowa
Kind of accident:	Derailment
Train involved:	Freight
Train number	97
Engine number:	5040
Consist:	44 cars, caboose
Speed:	40-45 m.p.h.
Operation:	Timetable, train orders, and automatic block-signal system
Track:	Double; tangent; 0.5 percent descending grade westward
Weather:	Clear, hot
Time:	12:40 p.m.
Casualties:	2 killed
Cause:	Kinked track

September 30, 1938.

To the Commission:

On August 3, 1938, there was a derailment of a freight train on the Chicago, Rock Island & Pacific Railway near Altoona, Iowa, which resulted in the death of two employees. This accident was investigated in conjunction with the Iowa State Commerce Commission.

Location and method of operation

This accident occurred on that part of the First District of the Des Moines Division designated as Subdivision 4, which extends between Missouri Division Junction and Des Moines, Iowa, a distance of 174.1 miles. In the vicinity of the point of accident this is a double-track line over which trains are operated by timetable, train orders and an automatic block-signal system. The accident occurred at a point 4.3 miles west of Altoona on the westward main track where the two main tracks are separated a distance of 500 feet by wooded land. Approaching this point from the east the track is tangent for more than 2,000 feet to the point of derailment, and for a distance of 1,631 feet west thereof, then there is a 1° curve to the left 4,199 feet in length. The grade is descending westward, being 0.5 percent for 2,000 feet to the point of derailment, then 0.1 percent for 1,200 feet west thereof, followed by 1,600 feet of 0.39 percent grade.

Bridge #3513, automatic block signal 3515 and Bridge #3517 are located 420 feet, 1,539 feet and 2,190 feet, respectively, west of the initial point of derailment. The final derailment occurred at Bridge #3517 which is composed of one 45-foot deck-plate girder span and a four-panel pile trestle at each end; this bridge is 18 feet above U. S. Highway No. 163.

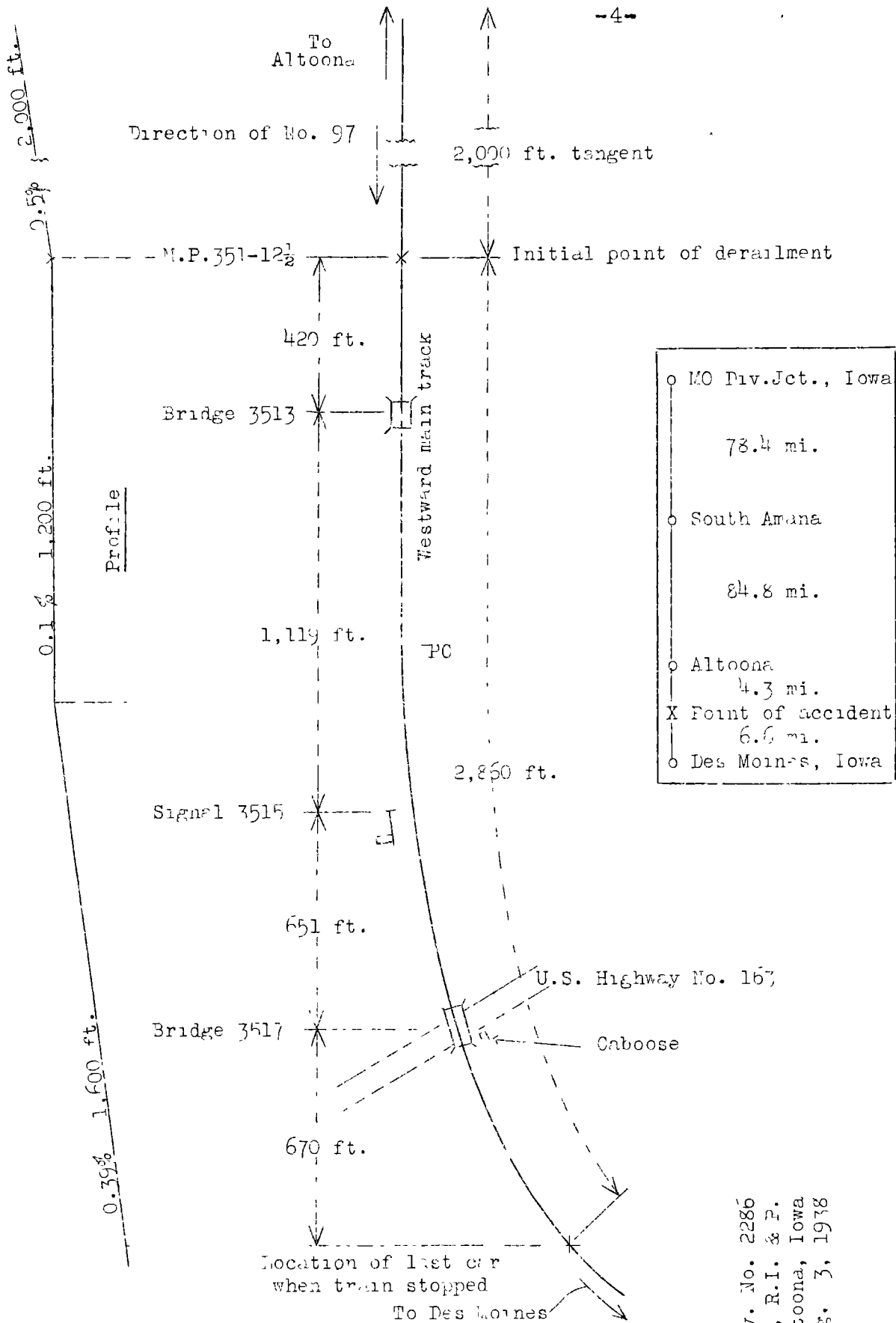
The track is laid with 100-pound rail, 33 feet in length, rolled and laid in 1915, on 20 treated hardwood ties with 4 rail anchors to the rail length; it is single-spiked, fully tieplated and the joints are staggered and slot spiked. The track is ballasted with 12 inches of gravel and is well maintained.

The maximum authorized speed for freight trains is 45 miles per hour.

The following instructions, dated August 1, 1929, were posted in all tool houses:

"ALL MAINTENANCE OF WAY EMPLOYEES:

Effective this date following rules are to be observed in connection with track work in order to avoid SUN KINKS:



Inv. No. 2286
 C., R.I. & P.
 Altoona, Iowa
 Aug. 3, 1938

"SUN KINKS ARE CAUSED BY:

- 1 - Creeping rail, which results in tight steel.
- 2 - Skeleton track, or track partly filled with loose ballast.
- 3 - Raising and lining track in extremely hot weather, especially at foot of heavy grades or in sags.
- 4 - Sun kinks may occur where a stretch of extremely light ballast is inserted between longer stretches of heavy ballast such as cinders following rock or gravel ballast.

"SUN KINKS MAY BE AVOIDED BY:

- 1 - Maintaining standard expansion by proper laying of steel and application of rail anchors.
- 2 - Avoiding skeleton track as much as possible and properly protecting skeleton or loosely filled track by slow orders.
- 3 - Not disturbing track during heat of day. When temperature is above 80 degrees, trouble may be expected, especially at the foot of grades or in sags.
- 4 - In surfacing track, wherever possible, the work should be done against the direction in which the rail tends to run.
- 5 - In short, sun kinks will not occur if track is properly handled and maintained.

Approved:

W. H. PETERSON
Chief Engineer

L. C. FRITCH,
Vice-President Operation."

Subsequent circulars were issued on May 21, 1937, and June 14, 1938, by the superintendent, calling attention to the instructions relative to the avoidance of sun-kinked rails.

The weather was clear and calm and the official temperature at the U. S. Weather Bureau in Des Moines was 92 degrees at the time of the accident, which occurred about 12:40 p.m.

Description

No. 97, a west-bound freight train, consisted of 44 cars and a caboose, hauled by engine 5040, and was in charge of Conductor McAvoy and Engineman Reichert. This train passed Altoona, the last open office, at 12:33 p.m., according to the train sheet. On nearing Bridge #3513 the lead truck of the last car and the rear truck of the caboose were derailed while traveling at a speed estimated to have been between 40 and 45 miles per hour.

The engine, tender and first 43 cars were not derailed. The derailed truck of the last car traveled on the ties close to the rails a distance of 2,860 feet to the point where the train stopped. The rear truck of the caboose was derailed to the left and the left wheels tore up the shoulder outside the ends of the ties until the caboose reached Bridge #3517 where the guard rails apparently threw the rear end over to such an extent as to cause it to topple off the bridge and it stopped on its left side, demolished, on the south side of the highway 15 feet below. The employees killed were the conductor and the rear brakeman.

Summary of evidence

Engineman Reichert stated that he had reduced speed to 30 or 35 miles per hour for a curve located about 2 miles east of the point of derailment and the train was drifting down the grade at a speed of 40 or 45 miles per hour when an emergency application of the brakes occurred about 12:40 p.m. The brakeman immediately dropped off the engine and proceeded toward the rear, and about 15 minutes later Engineman Reichert followed. Arriving at the scene of final derailment he met the brakeman and noted the partially derailed rear car, badly scarred bridge and the demolished caboose. Shortly thereafter a signal maintainer, and later a lineman who arrived at the scene, informed them of a sun kink in the track and they proceeded eastward on the lineman's motor car to a point a short distance east of Bridge #3513 where they found the track kinked and out of line with marks of derailment at the west end of the first sun kink. Engineman Reichert stated that he always observes the track closely; he was doing so in this instance and as far as he could see it was straight; it rode smoothly and was in good condition when the locomotive passed over it. He has been running over the track involved for a number of years and its general condition, as evidenced by the riding qualities of the engine, has been good and he has never known of any trouble due to heat at this particular point. The weather was clear, calm, and very hot when the accident occurred.

Fireman Hartmar and Brakeman Ayres corroborated the statement of the engineman in all essential details and added that block signal 3515 displayed a clear indication.

Section Foreman Newton stated that he and his two men were working on the track in the immediate vicinity on the day before and at the time the accident occurred. They had stopped work for the noon meal at a point about 475 feet east of the point of derailment shortly before it took place. While they were on the north side of the track, a westbound passenger train passed about 12:10 p.m. and a short time later No. 97 passed at a speed of about 45 or 50 miles per hour. There was nothing abnormal or unusual in the movement of either train. Shortly after No. 97 had passed, hearing an unusual noise, the section foreman looked westward on the track, noted its condition, and accompanied by one of his men immediately went to the caboose. Returning eastward to the point where the derailment occurred he found the track kinked to the south 9 inches at one point and 6 inches to the north at a point west thereof, both kinks being located within a distance of three or four rail lengths. It was necessary to disconnect the rails in order to re-align the track; when this was done the north and south rails overlapped about $2\frac{1}{2}$ and 3 inches, respectively, and he had to install shorter rails. The track work he had been doing prior to time of accident consisted of taking cross levels and spotting joints and centers which were raised $\frac{1}{4}$ to $\frac{1}{2}$ inch. On the day before the accident occurred, this work was performed westward a distance of 2,100 feet to within 262 feet of the point of derailment. He then started at a point 315 feet west of the point of derailment and had worked eastward against the current of traffic a distance of 525 feet. Resuming these duties on the following morning he had progressed to a point about 472 feet east of the initial point of derailment when it occurred. The ties were well tamped both inside and out, the ballast sections were well filled and the track was fully dressed up as the work progressed. No ties were installed. Both sun kinks were within the limits of the work which had been done against the current of traffic the day prior to the accident. The track at the point where the east kink and the initial derailment occurred was raised about $\frac{5}{4}$ inch between 2 and 3 p.m. on that date. The sub-shoulder was good at that point, the cribs were well filled, the shoulders well filled and the ballast section ample to hold the track in alinement. It had been necessary to raise the track at this particular point 7 or 8 times since spring because of soft spots caused by burrowing animals. Before working track in hot weather he observes the joints for signs of expansion. There was no indication on either day of the track moving or steel creeping. The alinement required no attention, the rail anchors were functioning against the ties and in substance he said that there was sufficient room for expansion in the track a distance of 8 or 10 poles on either side of the point where he was working shortly before the derailment occurred. Section Foreman Newton stated that it was so hot that metal tools had to be handled with gloves when the accident occurred and he estimated the temperature at about 125 or 130 degrees. He stated that he was familiar with the standard instructions relative to

sun kinks and the care of track during hot weather, and said that during his 21 years experience on this section the track had never kinked due to heat and it had never been necessary to cut the rail because of expansion at that particular point. He could advance no reason why the kink occurred.

Track Supervisor Linkey stated that foremen have written instructions in regard to working track in hot weather and precaution is taken at such times. If expansion is too great the rail is cut; if not, the cribs are kept well filled and the ballast banked against the ends of the ties. He passed over the track involved about 3:45 p.m. on the day before the accident occurred at which time Section Foreman Newton was spotting the track and the work was being done in a safe and proper manner, and with no danger of the track kinking out at that point. It was very hot but there was no indication of expansion sufficient to cause the track to jump out of alinement; there was sufficient ballast against the ends of the ties to hold the track in line and the rail anchors were functioning properly. He had never seen the track out of line at that point prior to the time the accident occurred and it had never been necessary to cut steel because of expansion. He could advance no reason for the occurrence of the sun kink.

Signal Maintainer Umphress passed over the portion of track involved in the accident on a motor-car about one hour prior to its occurrence, and at that time the track seemed to be in proper alinement and in good condition. He was in the immediate vicinity of signal 3515 when No. 97 passed and he looked over the train as it rounded the curve, but noticed nothing wrong until the rear end of the train came along and he saw the derailed caboose.

Measurements of the track taken by representatives of the railroad company from a point 1,500 feet east of the initial point of derailment showed the gage to vary from 4 feet $8\frac{1}{2}$ inches to a minimum of 4 feet $8\frac{1}{8}$ inches; the gage was not wide at any point. The difference in elevation between the north and south rails varied from level to $\frac{3}{4}$ inch. At the initial point of derailment the gage was standard, and the north rail was $\frac{3}{8}$ inch higher than the south rail. At a point 51 feet east of the initial point of derailment the track was kinked 9 inches out of line, and at a point 27 feet west of the initial point of derailment it was kinked 7 inches out of line. Marks on the track indicated that the lead truck of the last car became derailed to the north; at a point 8 feet west of the initial point of derailment there was a mark on a tie 11 inches inside the south rail, with a corresponding mark outside the north rail. The rear truck of the caboose became derailed to the south; at a point 65.2 feet west of the initial point of derailment there was a wheel mark $6\frac{1}{2}$ inches inside the north rail, with a corresponding mark

outside the south rail. The caboose wheel marks extended diagonally toward the left and there were indications that the concrete coping on the south side of Bridge #3513 had been struck twice and large pieces of concrete were broken out, following which, there were no caboose wheel marks for an interval of 21.6 feet. Caboose wheel marks then appeared on the ballast outside the south rail and on the ties just inside the south rail, while car wheel marks appeared just outside the north rail and inside the south rail, these marks extending to Bridge #3517 where the guard rails apparently threw the rear end of the caboose over to such an extent that the caboose fell off the bridge. Marks on the rails indicated that the lead truck of the caboose did not become derailed until it reached about the center of Bridge #3517; this bridge was badly scarred on the south side, but there was only slight damage to the bridge and track.

Discussion

No. 97 was proceeding at a speed of about 45 miles per hour when the rear car and the caboose became partially derailed. According to the evidence a west-bound passenger train had passed over this track about 30 minutes before No. 97 and the members of the crew who were on the head end of the latter train found nothing abnormal in the condition of the track; however, after the train involved in the accident had stopped, it was found that at a point about 2,800 feet to the rear of the train, within a distance of three or four rail lengths, the track at one point was out of alignment 9 inches to the south and at another point 6 inches to the north. After disconnecting the track to re-align it, the north and south rails overlapped 2-1/2 and 3 inches, respectively.

The weather was very hot at the time of the accident. Spot surfacing in the immediate vicinity had been done on the day previous to and on the day of the accident; this surfacing consisted of raising joints and centers from 1/4 to 1/2 inch and in one place 3/4 inch. The ties were well tamped and there was ample ballast between and at the ends of the ties; the track had not been otherwise disturbed. The rail anchors appeared to be functioning properly and there was no indication previous to the accident that the rails were creeping; there seemed to be sufficient room for expansion.

The accident occurred at a point where the gradient changed from 0.5 percent descending to 0.1 percent descending. Apparently the recently disturbed track and the high temperature created a condition making the track susceptible to creeping down the 0.5 percent descending grade; this condition combined with the force exerted as No. 97 passed in a westward direction caused the track to creep in the same direction to a point on the lesser grade where the track was more firmly anchored, resulting in a greater resistance to the creeping movement, which caused the track to deflect both to the north and to the south.

Conclusion

This accident was caused by kinked track.

Respectfully submitted,

W. J. PATTERSON

Director.