

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2707
THE NORTHERN PACIFIC RAILWAY COMPANY
REPORT IN RE ACCIDENT
NEAR BASS, MONT., ON
JUNE 20, 1943

SUMMARY

Railroad: Northern Pacific
Date: June 20, 1943
Location: Bass, Mont.
Kind of accident: Derailment
Train involved: Freight
Train number: Extra 1356 East
Engine number: 1356
Consist: 28 cars, caboose
Estimated speed: 25 m. p. h.
Operation: Timetable and train orders
Track: Single; tangent; level
Weather: Clear
Time: 7:35 p. m.
Casualties: 3 killed
Cause: Undermining of bridge pier
by flood water

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2707

IN THE MATTER OF MAKING ACCIDENT INVESTIGATION REPORTS
UNDER THE ACCIDENT REPORTS ACT OF MAY 6, 1910.

THE NORTHERN PACIFIC RAILWAY COMPANY

July 19, 1943.

Accident near Bass, Mont., on June 20, 1943, caused by
undermining of a bridge pier by flood water.

REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On June 20, 1943, there was a derailment of a freight train on the Northern Pacific Railway near Bass, Mont., which resulted in the death of three employees. This accident was investigated in conjunction with a representative of the Montana Board of Railroad Commissioners and Public Service Commission.

¹ Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.

Inv. No. 2707
Northern Pacific Railway
Bass, Mont.
June 20, 1943

Location of Accident and Method of Operation

This accident occurred on that part of the Rocky Mountain Division designated as the Thirteenth Sub-division and extending between Missoula and Darby, Mont., 65.4 miles. In the vicinity of the point of accident this was a single-track line over which trains were operated by timetable and train orders. There was no block system in use. The accident occurred at Bridge 23.2, which spanned Bitterroot River at a point 2.8 miles east of Bass. Approaching from the west there was a 2° curve to the left 2,746 feet in length, which was followed by a tangent 4,632 feet to the point of accident and 4,983 feet beyond. At the point of accident the grade was level.

Immediately west of Bridge 23.2 the track structure consisted of 90-pound rail, 33 feet in length, on 18 treated ties to the rail length. It was single-spiked, fully tieplated and laid on 3 to 5 inches of gravel ballast.

Bridge 23.2, reconstructed in 1928, was 428 feet 2 inches long. The approach at each end consisted of a pile and timber trestle 50 feet long, and the central structure consisted of three 120-foot steel truss-spans supported by pile and timber piers. The piers from east to west were numbered consecutively 1 to 3 and the truss spans 1 to 3. Pier 3, which supported the east end of truss span 1 and the west end of the east approach trestle, consisted of three parallel bents placed at right angles to the track. One bent had 12 piles and each of the other two had 11 piles. All piles were about 12 inches in diameter, 8-1/2 to 10 feet in length and driven to a penetration varying from 5-1/2 to 7 feet. The piles at the ends of the bents were placed in a batter of 1-1/2 inches to 1 foot. The bents were sway braced. A cap 14 inches by 14 inches by 26 feet was secured on top of each bent. Two 7-ply chords 12 inches by 12 inches by 8 feet were secured to the tops of these caps and at right angles to them. Three caps 12 inches by 14 inches by 26 feet were located on top of the chords, and they supported the east ends of the trusses of span 1. The west end of the east approach trestle was supported by a pony bent placed on top of a cap resting on the chords. This bent consisted of one cap 12 inches by 12 inches by 10 feet, and four posts 12 inches by 12 inches by 2 feet 10 inches. All piles and timbers except the bracing were treated. The trusses were 10 feet 1-1/2 inches high, and each had nine vertical members. The ties were untreated and were 10 inches by 12 inches by 12 feet 6 inches. Inside each running rail an iron guard rail extended the full length of the bridge and some distance on either side of each approach.

Regulations governing the maintenance-of-way department read in part as follows:

730.(M) * * * In times of unusual weather conditions or high water, be out day or night with proper signals and watch places most liable to damage and take every precaution to prevent accident.

* * *

The maximum authorized speed for freight trains was 40 miles per hour.

Description of Accident

Extra 1356 East, consisting of engine 1356, of the 4-6-0 type, 28 loaded cars and a caboose, departed from Darby, 29.4 miles west of Bass, about 5:55 p. m., passed Bass and while moving at an estimated speed of 25 miles per hour it was derailed on Bridge 23.2 at a point 397.5 feet east of the west end of the bridge.

The engine stopped, badly damaged, on its left side on the bed of the river, with the front end about 50 feet east of the east face of pier 3 and about 20 feet north of the track. The tender was torn loose from the engine and stopped, badly damaged, on its left side on the bed of the river, with the front end against the top of the engine cab. The first car became separated from the tender and stopped on top of the right side of the engine, and the second, third, fourth and fifth cars stopped in various positions at the rear of the first car. Of these cars, three were demolished and two were badly damaged.

It was clear and daylight at the time of the accident, which occurred at 7:35 p. m.

The engineer, the fireman and the front brakeman were killed.

According to data furnished by the carrier, the watershed drained by Bitterroot River contains about 2,100 square miles. Flood water caused the river to rise each spring, but prior to the accident there had been no damage to Bridge 23.2 by flood water. The water content of snow in the watershed area as of May, 1943, was 28 inches as compared with an average of 16.2 inches for seven preceding years. Normally the water was about 13 feet below the base of the rail at Bridge 23.2, but at the time of the accident it had risen to a height of about 9 feet below the base of the rail, or almost to the tops of the piles. In 1928 the east bank of the river extended about 80 feet west of the west face of pier 3. In 1938 the east bank had receded to about 25 feet west of the west face of pier 3, and at the time of the accident it had been scoured by flood water to about 15 feet east of its east face. Throughout this period the channel of the river had gradually shifted eastward.

Prior to the accident penetration of the piles of pier 3 was as follows:

<u>File No.</u>	<u>East Bent</u>	<u>Middle Bent</u>	<u>West Bent</u>
1	6.5 feet	7 feet	7 feet
2	6.5 feet	6 feet	7 feet
3	7 feet	6.6 feet	6.5 feet
4	6 feet	6.5 feet	7 feet
5	6.5 feet	6 feet	6 feet
6	6 feet	6.5 feet	6 feet
7	7.4 feet	6 feet	5.5 feet
8	6 feet	6 feet	7 feet
9	7 feet	6 feet	7 feet
10	7 feet	6.5 feet	7 feet
11	6.7 feet	6 feet	7 feet
12	6 feet		

Discussion

Extra 1356 East was moving on tangent track at an estimated speed of 25 miles per hour in territory where the maximum authorized speed was 40 miles per hour when the engine and the first five cars became derailed at a point about 32 feet west of the east end of Bridge 23.2. The conductor and the flagman, who were the only surviving members of the crew, stated that as the train was approaching this bridge the train was riding smoothly. The flagman said that the engine disappeared from his view when it reached the east end of span 1, then the train stopped abruptly. There was no application of the brakes immediately prior to the occurrence of the accident. This crew had charge of a west-bound freight train which passed over Bridge 23.2 about 3 hours prior to the time the accident occurred and which was the last train to pass over it prior to the accident, and they did not observe any unusual condition.

After the accident it was found that pier 3, which supported the east end of span 1 and the west end of the east approach of Bridge 23.2, had collapsed and was demolished. The east end of span 1 was on the bed of the river about 6 feet north of its normal position. The investigation disclosed that flood water had undermined the pier several feet below the maximum penetration of the piles.

Throughout a considerable distance west and east of Bridge 23.2, there was an unobstructed view of the bridge. Since both of the enginemen and the front brakeman were killed in the accident, it could not be determined when they first became aware of the defective condition of the bridge. Evidently the track on the bridge appeared to be in normal surface and alinement, and the pier collapsed and the span became unseated under the weight of the engine, as the brakes were not applied before the engine was derailed.

Bitterroot River at Bridge 23.2 had been at flood stage several days prior to the time of the accident. An examination of pier 3 on June 2 disclosed that the channel had shifted eastward and the east bank at pier 3 had been scoured by flood water to

within 2 or 3 feet west of the west face of the pier. The section foreman immediately notified the officials of this condition, and on June 7 bridge forces placed two car loads of small stone around the pier. The section foreman last inspected pier 3 on the day previous to the occurrence of the accident, and he observed that the water was within 1 foot of the west face of the pier. He did not know the penetration of the piles, but he was of the opinion that the pier was in safe condition. After the accident he observed that the water had risen considerably after his last inspection. Of the 34 piles of pier 3, only 2 were found near the bridge.

During a period of about 15 years prior to the accident, the channel of the river in the vicinity of Bridge 23.2 had gradually shifted eastward and the east bank of the river had receded a distance of approximately 80 feet to within a few feet of the west face of pier 3. The investigation disclosed that the maximum penetration of the piles of pier 3 was 7 feet. The stratum in which the piles were driven consisted of hard gravel, and the records made at the time the piles were driven indicated that it was not possible to obtain greater penetration. However, after the accident, piles were driven in the same location to a point about 15 feet below the maximum penetration of the original piling. The gradual encroachment of the channel toward the east end of the bridge and the rising of the water level to flood proportions caused the water to scour the footing of the pier below the lower ends of the piling.

Cause

It is found that this accident was caused by the undermining of a bridge pier by flood water.

Dated at Washington, D. C., this nineteenth day of July, 1943.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.