

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 3199
GREAT NORTHERN RAILWAY COMPANY
REPORT IN RE ACCIDENT
AT FERO, N. DAK., ON
AUGUST 16, 1948

SUMMARY

Railroad: Great Northern
Date: August 16, 1948
Location: Fero, N. Dak.
Kind of accident: Derailment
Train involved: Passenger
Train number: 3
Engine number: Diesel-electric units
358A, 358B and 358C
Consist: 18 cars
Speed: 55 m. p. n.
Operation: Timetable, train orders and
automatic block-signal system
Track: Single; tangent; 0.10 percent
ascending grade westward
Weather: Clear
Time: 9:01 p. m.
Casualties: 108 injured
Cause: Defective condition of spring-
frog assembly

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3199

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

GREAT NORTHERN RAILWAY COMPANY

November 5, 1948

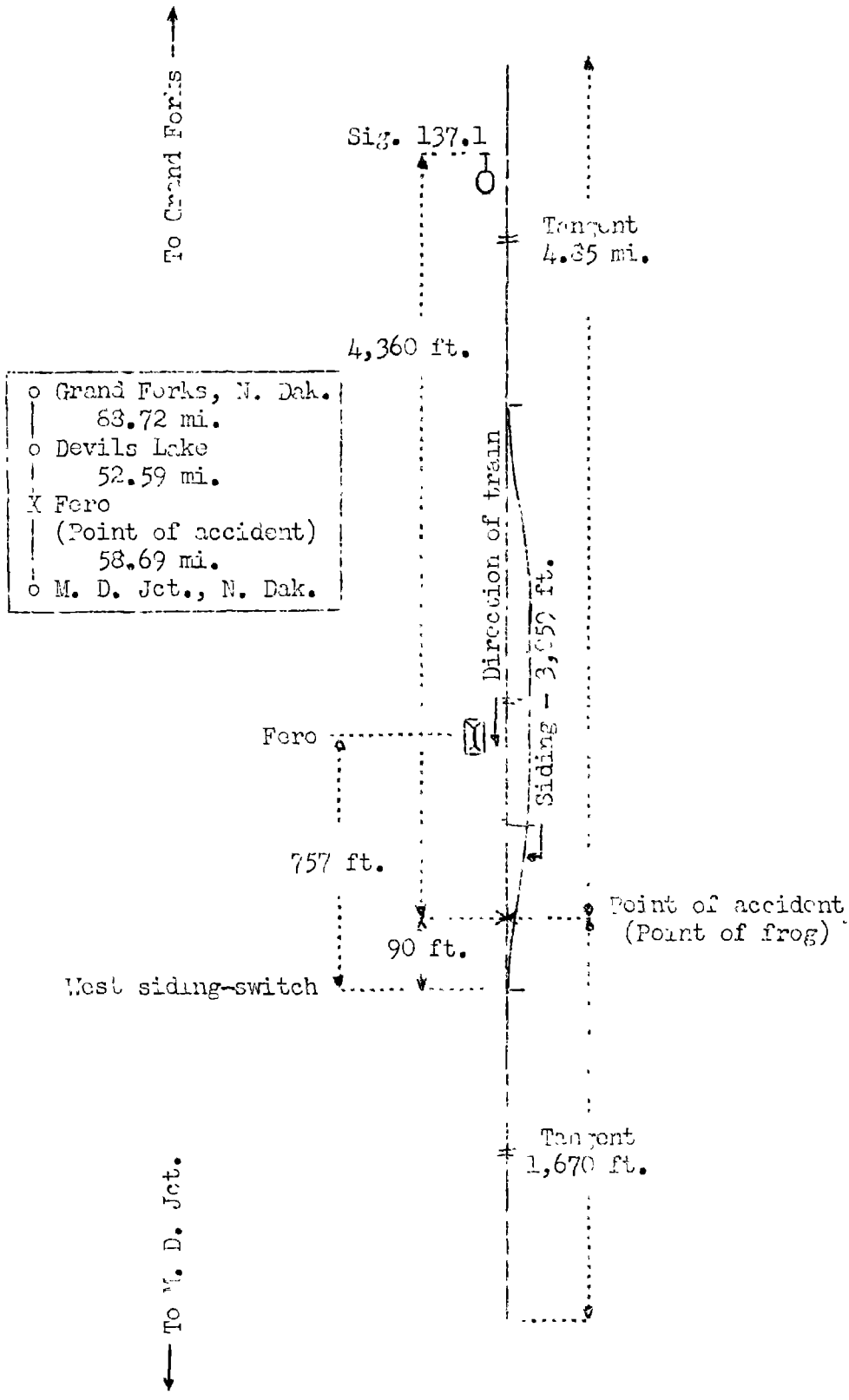
Accident at Fero, N. Dak., on August 16, 1948, caused by
defective condition of a spring-frog assembly.

REPORT OF THE COMMISSION ¹

PATTERSON, Commissioner:

On August 16, 1948, there was a derailment of a
passenger train on the Great Northern Railway at Fero,
N. Dak., which resulted in the injury of 101 passengers
and 7 dining-car employees.

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



- o Grand Forks, N. Dak. 63.72 mi.
- o Devils Lake 52.59 mi.
- X Fero (Point of accident) 58.69 mi.
- o M. D. Jct., N. Dak.

Inv. No. 3199
 Great Northern Railway
 Fero, N. Dak.
 August 16, 1948

Location of Accident and Method of Operation

This accident occurred on that part of the Dakota Division extending between Grand Forks and M. D. Jet., N. Dak., 200 miles. In the vicinity of the point of accident this is a single-track line, over which trains are operated by timetable, train orders and an automatic block-signal system. At Fero, 141.31 miles west of Grand Forks, a siding 3,059 feet in length parallels the main track on the south. The west switch of this siding is 757 feet west of the station. The accident occurred on the main track at the point of frog of the west turnout, 90 feet east of the switch. The main track is tangent throughout a distance of 4.85 miles immediately east of the point of accident and 1,670 feet westward. The grade is 0.10 percent ascending westward.

The structure of the main track consists of 90-pound rail, 39 feet in length, laid new during 1926 on an average of 24 treated ties per rail length. It is fully tieplated, single-spiked, provided with 24-inch 4-hole joint bars and 8 rail anchors to tie rail length. It is ballasted with gravel to a depth of 12 inches below the ties. At the point of derailment the gage was 4 feet 3-1/2 inches, the alignment was tangent, and the south rail was 1/4-inch lower than the north rail.

The structure of the west turnout of the siding consists of a No. 11 spring-rail type frog, the angle of which is $5^{\circ}12'$, 90-pound rails and switch rails, and two 13-foot guard rails. The frog involved was 16 feet 6 inches long, and was laid on 11 treated switch-ties, and was equipped with base-bearing plates. For through movements on the main track, the carrier's specifications require that a 1-7/8-inch flangeway be provided between the rigid-wing rail and the frog point. For movements through the turnout, they require that the spring-wing rail be adjusted for a 1-7/8-inch flangeway when fully open. The spring-wing rail was 13 feet 7-1/4 inches long, and was held in normal position by two coil springs mounted on a 1-1/8-inch rod, which extended through the rigid-wing rail, the frog point and the spring-wing rail at a point 15 inches east of the actual point of frog. The coil springs were enclosed in malleable iron housings held in position by two adjusting nuts on the threaded ends of the 1-1/8-inch rod. Normally, excessive vertical movement of the spring-wing rail was prevented by two hold-downs, which consisted of horns projecting at right angles from the spring-wing rail into inverted U-shape housings. To prevent the spring-wing rail from rising excessively, the specifications require the horns to be adjusted for only 1/8-inch clearance within the housings. Horizontal movement was controlled by a grace-stop located approximately 14 inches west of the point of frog and riveted

to a bearing plate. The spring-wing rail was 16-1/2 inches longer than the rigid-wing rail, and the free end was flared throughout a distance of 20 inches to enable wheels to open the spring-wing rail during movement on the turnout. A triangular section was planed from the head of the spring-wing rail to provide channeling for the treads of the wheels moving on the main track. To prevent undesired opening of the spring-wing rail, this channeling was 1/2-inch deep at the apex, and level at the point where a wheel-tread fully covers both rails. Crimped metal foot-guards were provided at the throat of the frog and between the short-point rail and the long-point rail.

Automatic signal 137.1, governing west-bound movements, is 4,360 feet east of the point of accident.

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

SECTION FOREMEN

* * *

164. They must make a personal inspection of their sections at designated intervals, examining particularly main track switches and frogs, looking for concealed defects or breaks.

The maximum authorized speed for the train involved was 60 miles per hour.

Description of Accident

No. 3, a west-bound first-class passenger train, consisted of Diesel-electric units 358A, 358B and 358C, coupled in multiple-unit control, one baggage-mail-express car, one baggage-express car, one dormitory coach, three coaches, three sleeping cars, two dining cars, six sleeping cars and one parlor car, in the order named. All cars were of steel construction. This train left Devils Lake, the last open office, at 7:47 p. m., on time, passed signal 137.1, which indicated proceed, and while moving at a speed of 55 miles per hour the left rear wheel of the front truck of the third Diesel-electric unit, the rear truck of the first car, and the third to the tenth cars, inclusive, were derailed at the frog of the west turnout of the siding at Fero.

Separations occurred at each end of the fourth car. The Diesel-electric units and the first three cars, remaining coupled, stopped with the front end of the first unit 1,505 feet west of the point of accident. The third car stopped in line with the track and leaned to the south at an angle of about 30 degrees. The fourth car stopped on its right side, about 600 feet east of the third car and at right angles to the track, with the rear end across

the track and the front end 60 feet south of the track. The fifth to the tenth cars, inclusive, stopped upright and in various positions, with the front end of the fifth car 75 feet south of the track and 563 feet west of the point of accident, and the rear end of the tenth car on the ties about 115 feet west of the point of accident. The fourth car was badly damaged, and the remainder of the derailed cars were slightly damaged. None of the cars was equipped with tightlock couplers.

The weather was clear at the time of the accident, which occurred about 9:01 p. m.

The Diesel-electric units involved are of the 3-4-4-0 classification. The first and the third units are 50 feet 8 inches in length, and are provided with control compartments. The second unit is of the booster class, and is 50 feet in length. The total length of the three units coupled is 151 feet 4 inches. The trucks upon which the traction motors are mounted are of the swing-motion type, and their wheelbase is 9 feet in length. The truck-centers of each unit are spaced 30 feet apart. The total weight of the three units in working order is 741,600 pounds. The specified diameter of the driving wheels is 40 inches. All driving wheels are equipped with roller bearings.

Discussion

No. 3 was moving on tangent track at a speed of 55 miles per hour, as indicated by the tape of the speed-recorder with which the first Diesel-electric unit was equipped, in territory where the maximum authorized speed for this train was 60 miles per hour, when the derailment occurred. Prior to the time of the accident the Diesel-electric units and the cars of the train had been riding smoothly.

As No. 3 was approaching Faro the headlight was lighted brightly, the enginemen were in the control compartment at the front of the first Diesel-electric unit, and the members of the train crew were in various locations throughout the cars of the train. Signal 137.1 indicated proceed for No. 3. The first that these employees were aware of anything being wrong was when they felt the brakes become applied in emergency at the time of the derailment.

Examination of the track throughout a considerable distance eastward from the frog involved disclosed no indication of defective track, dragging equipment, or of any obstruction having been on the track. The surface, gage and alinement were well maintained. The main track and the west turnout of the siding had been inspected by a track inspector about 2 p. m. on the day of the accident.

The first mark on the track structure was a scraping mark at the top of the inside face of the spring-wing rail, starting at a point about 3 feet east of the frog point and extending westward about 4 feet. At this point the scraping mark progressed downward and wheel marks appeared on the crimped foot-guard west of the point of frog. The spring-wing rail was kinked outward slightly at the point of frog. Opposite the point of frog the north rail was moved about 1 inch outward throughout a distance of 18 feet. Starting at the point of frog the south rail was moved outward between 1 inch and 1-1/4 inches throughout a distance of 157 feet to a point where the joint-bar bolts were sheared inside the south rail. From this point westward throughout a distance of 430 feet the track was destroyed. Examination of the left rear wheel of the front truck of the third Diesel-electric unit disclosed scraping marks on the outer surface of the rim. The marks on this wheel, on the spring-wing rail, and on the track structure west of the point of frog indicate that the outer edge of the rim of the wheel engaged the inside surface of the spring-wing rail and forced it outward sufficiently for the wheel to drop into the throat at the point of frog.

The frog assembly involved was installed at this location about 20 years prior to the date of the accident. The spring-wing rail of this frog had been applied about 10 years prior to the date of the accident. At a point 6 inches east of the point of frog the top surface of the frog point was 5/16 inch lower than the top surface of the spring-wing rail. Three days before the accident occurred the section force placed three new treated ties under the frog-point assembly. These ties were securely tamped and were firmly attached to the frog plates and rail base. The track structure at each end of the frog assembly was not disturbed. There was plate-cutting of about 1/2-inch on the tops of the older ties, and the spikes at these locations were somewhat rail-pulled. This condition resulted in pumping, or rocking, action at both ends during movement over the frog. The clearance within the hold-down assemblies was in excess of the carrier's specified clearance of 1/8-inch. The point where the scraping mark appeared on the spring-wing rail was about 9 feet east of the leaving end. The wheelbase of each of the traction-trucks of the Diesel-electric units is 9 feet. It is apparent that there was sufficient rocking action of the frog assembly, combined with excessive slack in the hold-down housings, and wear on the frog point to permit the leaving end of the spring-wing rail to be deflected downward and the flared end to rise high enough for the outer edge of the rim of the left rear wheel of the front truck of the third Diesel-electric unit to engage the inside surface, and then the rail was forced outward and canted until the throat immediately west of the point of frog became wide enough for this wheel to drop inside the south rail.

On July 8, 1948, there was a derailment of a passenger train on the line of this carrier at Dassel, Minn. The investigation of that accident disclosed circumstances similar to those in the present investigation, in that a wheel of a traction-truck of a Diesel-electric unit forced a spring-wing rail open sufficiently for the wheel to drop into the throat. That accident as in the present accident, was caused by defective condition of a spring-frog assembly. Serious consideration should be given by this carrier to the matter of providing adequate maintenance and repairs of this type of frog assembly.

Cause

It is found that this accident was caused by defective condition of a spring-frog assembly.

Dated at Washington, D. C., this fifth day of November, 1948.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.