INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 3194

GREAT NORTHERN RAILWAY COMPANY

REPORT IN RE ACCIDENT

AT DASSEL, MINN., ON

JULY 8, 1948

SUMMARY

Railroad:	Great Northern
Date:	July 8, 1948
Location:	Dassel, Minn.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	4
Engine number:	Diesel-electric units 355C, 355B and 355A
Consist:	19 cars
Speed:	65 m. p. h.
Operation:	Timetable, train orders and automatic block-signal system
Track:	Single; tangent; 0.3 percent descending grade eastward
Weather:	Clear
Time:	8:33 p. m.
Casualties:	21 injured
Cause:	Defective spring-frog assembly

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3194

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

GREAT NORTHERN RAILWAY COMPANY

October 8, 1948

Accident at Dassel, Minn., on July 8, 1948, caused by a defective spring-frog assembly.

REPORT OF THE COMMISSION[1]

PATTERSON, Commissioner:

On July 8, 1948, there was a derailment of a passenger train on the Great Northern Railway at Dassel, Minn., which resulted in the injury of 12 passengers, 4 railway-mail clerks, 4 dining-car employees and 1 train-service employee off duty.

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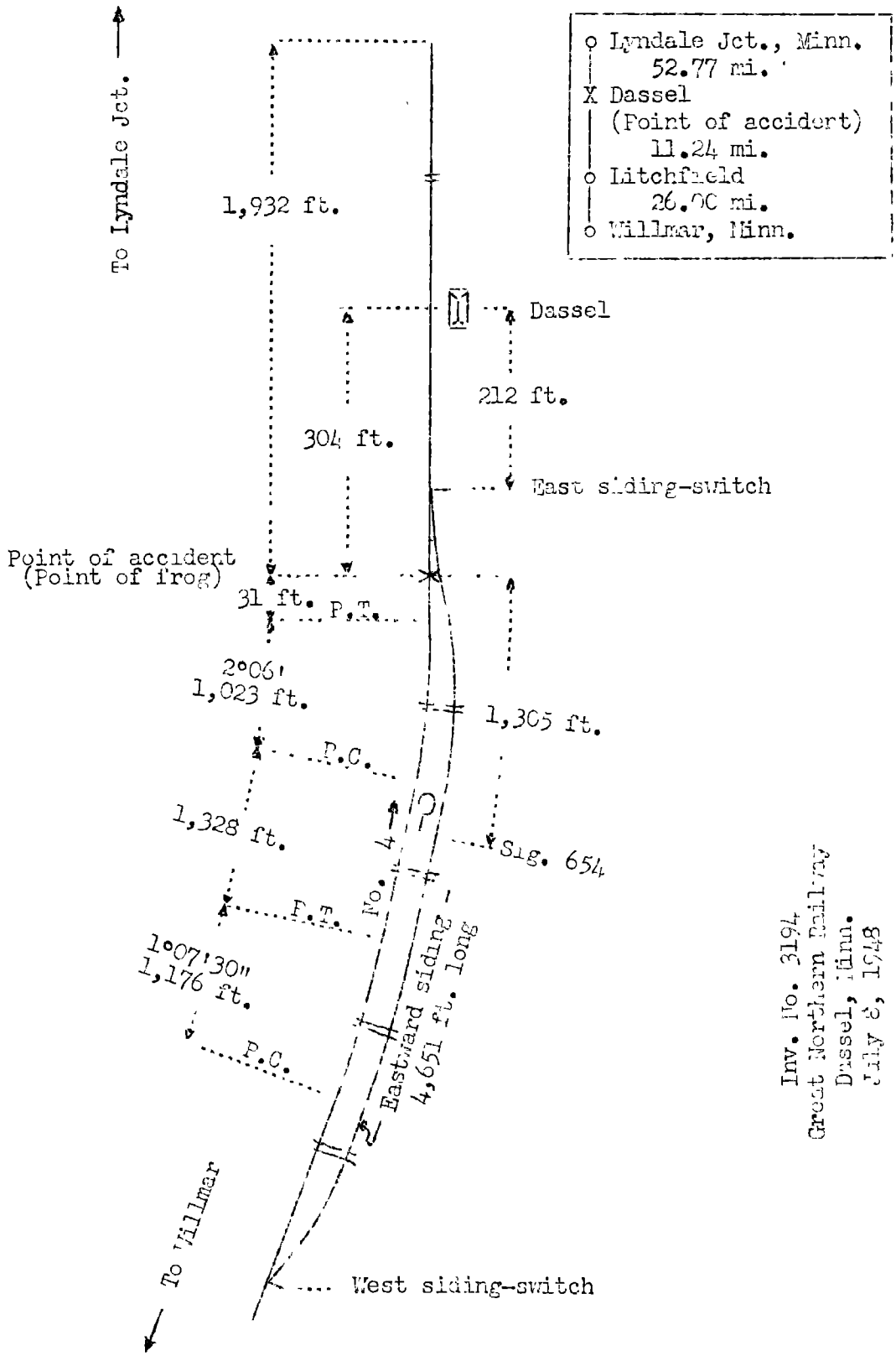
[1] Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.



Inv. No. 3194
Great Northern Railway
Dassel, Minn.
July 8, 1948

Location of Accident and Method of Operation

This accident occurred on that part of the Willmar Division extending between Willmar and Lyndale Jct., Minn., 90.01 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 Dassel, 37.24 miles east of Willmar, the eastward siding, which is 4,651 feet in length, parallels the main track on the south. The east switch of this siding is 212 feet west of the centerline of the station. The accident occurred on the main track 304 feet west of the station, at the frog of the east switch of the eastward siding. From the west there are, in succession, a 1°07'30" curve to the left 1,176 feet in length, a tangent 1,728 feet, a 2°06' curve to the left 1,023 feet and a tangent 31 feet to the point of accident and 1,952 feet eastward. The grade is 0.3 percent descending eastward.

The structure of the main track consists of 110-pound rail, 39 feet in length, rolled during 1928, and laid on an average of 24 ties to the rail length. It is fully tieplated with single-shoulder tie plates, double-spiked on curves and single-spiked on tangents, provided with 26-inch 4-hole joint bars, and an average of 14 rail anchors per rail length. It is ballasted with crushed rock and gravel to a depth of 18 inches below the ties. At the point of derailment the gage was 4 feet 8-5/16 inches, the alinement was tangent, and there was no variation in the cross-level.

The structure of the east turnout of the eastward siding consists of 76 treated switch ties, a No. 11 spring-rail type frog, the angle of which is 5°12', 110-pound rails and switch rails, and two 13-foot guard rails. The frog involved was 17 feet 9 inches long, and was laid during 1947 on 12 treated switch ties. These ties were provided 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 12 feet 5-1/2 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 west of the actual point of frog. The coil springs were enclosed in malleable iron housings held in position by two adjustable 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 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. The housings were inverted U-shape, and were bolted to their base plates by 3/4-inch bolts. Horizontal movement was controlled by a brace-stop located approximately 14 inches east of the point of frog and riveted to a bearing plate. The spring-wing rail was 1/2 inch 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 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 covered both rails. A foot-guard 24 inches in length was attached between the short-point rail and the long-point rail, and a similar foot-guard was between the rigid-wing rail and the spring-wing rail.

Automatic signal 654, governing east-bound movements, is 1,305 feet west 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 70 miles per hour on tangent track, and 65 miles per hour on the curve immediately west of the point of accident.

Description of Accident

No. 4, an east-bound first-class passenger train, consisted of Diesel-electric units 355C, 355B and 355A, coupled in multiple-unit control, two express-refrigerator cars, one mail car, two baggage cars, one dormitory car,

three coaches, one sleeping car, two dining cars, six sleeping cars and one observation-lounge car, in the order named. The first, second and fourth cars were of steel-underframe construction with wooden superstructure, the seventh and eighth cars were of lightweight high-tensile-steel construction and the remainder of the cars were of heavy steel construction. This train departed from Litchfield, the last open office, 11.24 miles west of Dassel, at 8:22 p. m., 10 minutes late, passed signal 654, which displayed proceed, and while it was moving at a speed of 65 miles per hour the rear truck of the third Diesel-electric unit, and the first to the fourteenth cars, inclusive, were derailed at the frog of the east turnout of the eastward siding at Dassel.

None of the cars of the train were equipped with tightlock couplers. Separations occurred at each end of the second, third and fourth cars. The Diesel-electric units and the first car, remaining coupled, stopped with the front end of the first unit 1,506 feet east of the point of frog. The first car stopped in line with the track and leaned to the north at an angle of 15 degrees. The second car stopped in line with the track and leaned to the north at an angle of 30 degrees, with its front end 447 feet west of the first car. The third car stopped on its left side, across the main track and at an angle of 40 degrees to it, with its front end about 5 feet west of the second car. The fourth car stopped across the main track and practically at right angles to it and leaned to the east at an angle of 45 degrees. The front end was against the rear of the third car. The fifth to fourteenth cars, inclusive, stopped in line with each other, with the front end of the fifth car 40 feet south of the main track and 755 feet east of the frog. The front truck of the fourteenth car was 30 feet east of the frog. These cars leaned at angles varying between 5 and 30 degrees. The second car was considerably damaged, and the rear truck was demolished. The third and the fourth cars were badly damaged, and the remainder of the derailed cars were more or less damaged.

The weather was clear at the time of the accident, which occurred about 8:33 p. m.

The Diesel-electric units involved are of the 0-4-4-0 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 long. 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-wheel journals are equipped with roller-bearings.

Discussion

No. 4 was moving at a speed of 65 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 65 miles per hour, when the rear truck of the third Diesel-electric unit and the first to the fourteenth cars, inclusive, became derailed at the frog of the east turnout of the eastward siding at Dassel.

As No. 4 was approaching Dassel the headlight was lighted brightly, the enginemen were maintaining a lookout ahead from their respective positions in the control compartment of the first Diesel-electric unit, and the members of the train crew were in various locations throughout the cars of the train. Signal 654 displayed proceed for No. 4. The first the members of the crew were aware of anything being wrong was when the brakes became applied in emergency as a result of separations between cars. Prior to the time of the accident the Diesel-electric units and the cars had been riding smoothly. The brakes of this train had functioned properly en route.

Examination of the equipment after the accident disclosed no defective condition which could have contributed to the cause of the derailment. The four pedestals of the rear truck of the second car were broken as a result of the derailment. The pedestal tie-bars were broken, but their condition indicated that they were securely bolted in place up to the time of the derailment.

Examination of the track throughout a considerable distance westward 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 first indication of derailment was a scraping mark on the gage surface of the spring-wing rail starting at the frog point and progressing eastward and downward. The foot guard attached to the spring-wing rail at a point 3 feet 2-1/2 inches east of the point of frog was torn loose, and wheel marks appeared on the base from that point eastward to the leaving end of the frog assembly. From this point eastward single flange marks appeared on the tops of the ties inside the south rail and outside the north rail a distance of 90 feet to the switch of the turnout, then the track was destroyed throughout a distance of 855 feet eastward.

Examination of the frog assembly disclosed that the spring-wing rail was considerably rim-cut by wheels across the planed section between points about 36 inches and 12 inches west of the point of frog. This cut was parallel to the gage side of the main-track rail and about 4 inches south of the gage side. The leaving end of the spring-wing rail was badly battered as a result of the pumping of ties. Both casings of the return spring were bent downward, the spring rod was bent, the spring-wing rail was kinked outward at the foot-guard location, and the normal bend of this rail at the point-of-frog was straightened. The condition of the fastenings of the hold-down housings permitted vertical movement of 7/8-inch at the No. 1 housing and 7/16-inch at the No. 2 housing. Both hold-down assemblies had 1/2-inch clearance within the housings, instead of the specified clearance of 1/8-inch. The base stop and its plate were bent outward. The top surface of the flared end of the spring-wing rail was 1 inch above its normal elevation. There was no mark on the flared end of the spring-wing rail, the hold-down housings or the base-stop to indicate that the improper adjustments were caused as a result of their being struck during the derailment.

The wheelbase of each of the traction trucks of the Diesel-electric units is 9 feet long, and the distance between the leaving end of the spring-wing rail and the planed section of the frog is about 9 feet. Considering the conditions disclosed in the investigation, it is apparent that there was sufficient deflection at the leaving end of the spring-wing rail, combined with excessive slack

in the hold-down housings and their plates, to permit the flared end to rise high enough for the outer edge of the rim of the right rear wheel of the rear truck of the third Diesel-electric unit to engage the inside surface, and the rail was forced outward and canted until the throat immediately east of the point of frog became wide enough for this wheel to drop inside the south rail. Then the companion wheel dropped outside the north rail.

Cause

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

Dated at Washington, D. C., this eighth day of October, 1948.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.