INTERSTATE COMMERCE COMMISSION

WASHINGTON

INVESTIGATION NO. 3193

THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY

REPORT IN RE ACCIDENT

AT WINSLOW, ARIZ., ON

JUNE 29, 1948

SUMMARY

Railroad:	Atchison, Topeka and Santa Fe
Date:	June 29, 1948
Location:	Winslow, Ariz.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	18
Engine numbers:	Diesel-electric units 26C, 26B, 26A and 26L
Consist:	12 cars
Speed:	83 m. p. h.
Operation:	Signal indications
Track:	Double; 8° curve; 0.47 percent descending grade eastward
Weather:	Clear
Time:	9:10 a. m.
Casualties:	56 injured
Cause:	Excessive speed on curve

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 3193

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

THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY

November 3, 1948

Accident at Winslow, Ariz., on June 29, 1948, caused by excessive speed on a curve.

REPORT OF THE COMMISSION[1]

PATTERSON, Commissioner:

On June 29, 1948, there was a derailment of a passenger train on the Atchison, Topeka and Santa Fe Railway at Winslow, Ariz., which resulted in the injury of 47 passengers, 1 railway-mail clerk, 2 dining-car employees, 1 club-car attendant and 5 train-service employees. This accident was investigated in conjunction with a representative of the Arizona Corporation Commission.

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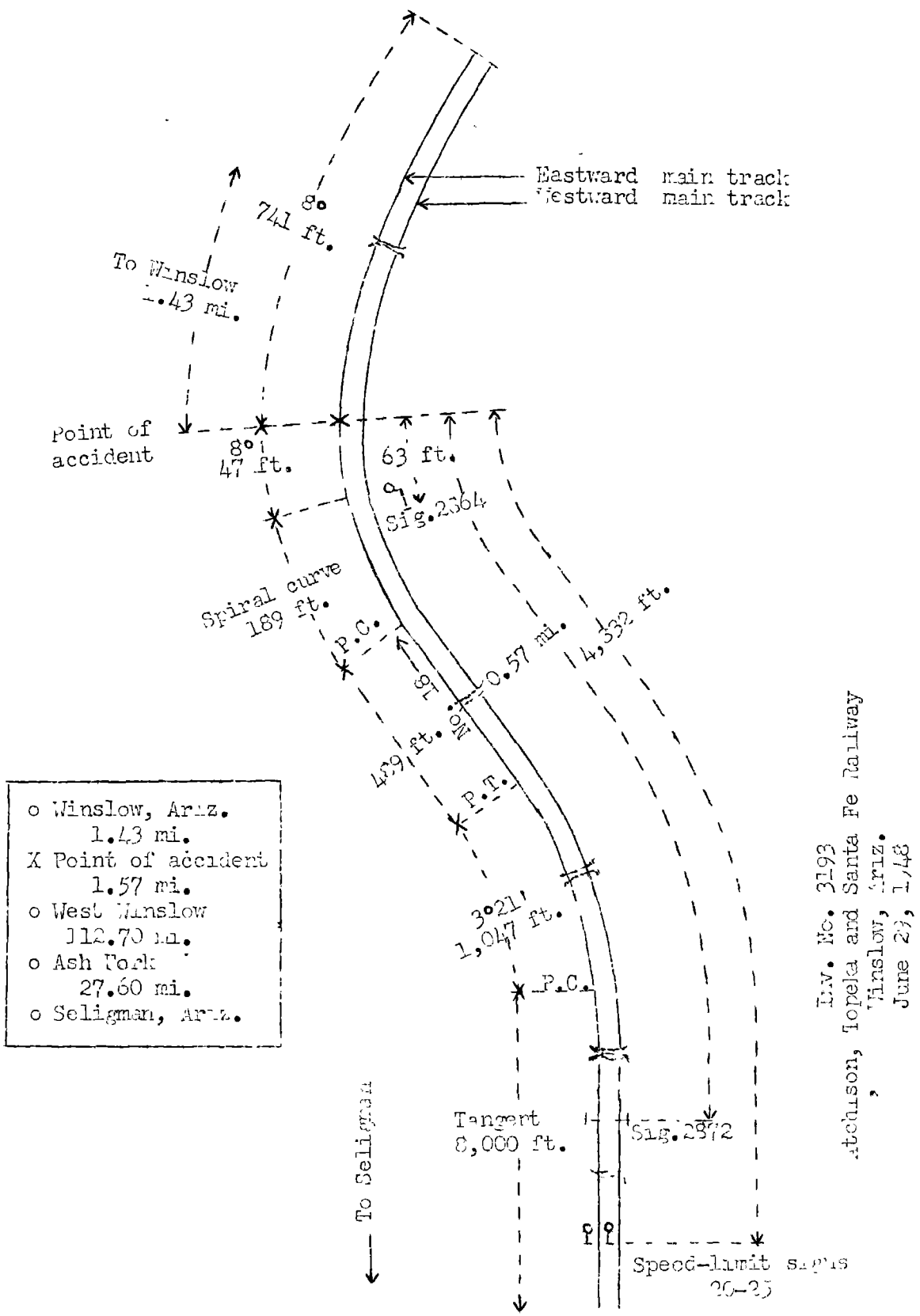
[1] Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Patterson for consideration and disposition.



I.V. No. 3193
Atchison, Topeka and Santa Fe Railway
Winslow, Ariz.
June 23, 1948

Location of Accident and Method of Operation

This accident occurred on that part of the Albuquerque Division extending between Seligman and Winslow, Ariz., 143.6 miles, a double-track line, over which trains moving with the current of traffic are operated by signal indications. The current of traffic is to the left. The accident occurred on the eastward main track at a point 141.87 miles east of Seligman and 1.45 miles west of the station at Winslow. From the west on the eastward main track there are, in succession, a tangent 8,000 feet in length, a 3°21' curve to the left 1,047 feet, a tangent 489 feet, a spiral curve to the right 189 feet and an 8° curve to the right 47 feet to the point of accident and 741 feet eastward. The grade for east-bound trains is generally descending throughout a distance of 40 miles, then it is, successively, level 293 feet, 0.60 percent ascending 2.23 miles, 1.42 percent descending 1,846 feet, 0.22 percent descending 2,704 feet, 1.12 percent descending 2,103 feet, 0.43 percent descending 860 feet, 0.53 percent descending 310 feet, 0.41 percent descending 1,400 feet and 0.47 percent descending 48 feet to the point of accident and 1,052 feet eastward.

On the curve on which the accident occurred the structure of the eastward main track consists of 110-pound rails, 39 feet in length, rolled in 1927, and relaid in their present location during 1945 on an average of 26 treated ties to the rail length. It is fully tieplated with single-shoulder tieplates, single-spiked, provided with 4-hole 26-inch flanged joint bars, and an average of six rail anchors per rail length. It is ballasted with volcanic cinders to a depth of 10 inches below the ties. The specified superelevation on the 8° portion of the curve was 2 inches. At the point of derailment the superelevation was 1-15/16 inches, the gage was 4 feet 9 inches, and the curvature was 8°.

Automatic signals 2872 and 2864, governing east-bound movements on the eastward main track, are, respectively, 0.57 mile and 63 feet west of the point of derailment. These signals are of the searchlight type, and are continuously lighted.

This carrier's operating rules read in part as follows:

DEFINITIONS.

* * *

Fixed Signal.--A signal of fixed location indicating a condition affecting the movement of a train.

Note to Definition of Fixed Signal.--The definition of a "Fixed Signal" covers such signals as slow boards, * * *

ENGINEMEN.

457. They must look back frequently, * * * to detect any defects in their train and for signals, and must require fireman and brakeman to do likewise.

Time-table special instructions read in part as follows:

4. * * *

Permanent slow boards, painted yellow with black numerals, will be located not less than 2500 feet in advance of locations where speed of trains must be reduced. The numerals thereon nearest the track indicate the maximum speed for passenger trains and on the field side the maximum speed for freight trains.

* * *

Time-table special instructions prescribe the maximum authorized speed for the train involved as 100 miles per hour on tangent track, and 25 miles per hour on the 3°21' curve immediately west of the point of accident and on the curve on which the derailment occurred. An octagonal-shape speed-limit sign, 36 inches wide and 15 inches high and bearing the numerals 20-25 in black outlined by colorless reflector buttons on a yellow background, is mounted on a mast 7 feet 11-1/8 inches north of the north rail of the eastward main track. The center of this sign is 7 feet 6 inches above the level of the tops of the rails. Another speed-limit sign, 9-1/2 inches wide and 26 inches high and bearing the numerals 25-20, is located between the main tracks 4 feet 7-1/2 inches south of the south rail of the eastward main track. The center of this sign is 13 inches above the level of the tops of the rails. These signs are located 4,832 feet west of the point of derailment.

Description of Accident

No. 18, an east-bound first-class passenger train, consisted of Diesel-electric units 26C, 26B, 26A and 26L in multiple-unit control, one mail car, one baggage car, one baggage-club car, four sleeping cars, one lounge car, one

dining car and three sleeping cars, in the order named. All cars were of modern lightweight high-tensile steel construction. This train departed from Ash Fork, 115.7 miles west of Winslow, at 6:59 a. m., 4 minutes late, passed West Winslow, the last open office, 3 miles west of Winslow, at 9:09 a. m., on time, passed the speed-limit signs, passed signals 2872 and 2864, which displayed proceed indications, and while moving at a speed of 83 miles per hour the Diesel-electric units and the first five cars were derailed at a point 1.57 miles east of West Winslow.

The Diesel-electric units and all of the cars were equipped with controlled-slack couplers. Separations occurred at each end of the second and the third cars. The Diesel-electric units and the first car remained coupled and stopped on their left sides, across auxiliary tracks immediately north of the main tracks and parallel to them, with the front end of the first unit 531 feet east of the point of derailment and 90 feet north of the eastward main track. The first unit stopped at an angle of 45 degrees to the tracks, the second unit at an angle of 30 degrees, and the third and fourth units and the first car practically parallel to the tracks. The second car stopped on its left side, across the auxiliary tracks and at an angle of 45 degrees to them, with the front end 20 feet north of the eastward main track and against the first car. The third car stopped in reverse direction, on its right side, against the second car and parallel to it. The fourth car stopped upright, with the front end 591 feet east of the point of derailment and 15 feet north of the eastward main track and the rear end on the eastward main track. The fifth car remained upright and in line with the track. The separation between the third and fourth cars occurred as a result of a broken coupler at the front end of the fourth car. The first, second and fourth cars were badly damaged, the third car was destroyed and the fifth car was slightly damaged. The first unit of the engine struck a cut of three cars standing on an adjacent track. Of these cars, one was destroyed and the other two were slightly damaged. The rear trucks of the first and second Diesel-electric units were torn loose, and all four units were badly damaged.

The engineer, the fireman, the conductor, the front brakeman and the flagman were injured.

The weather was clear at the time of the accident, which occurred at 9:10 a. m.

The Diesel-electric units involved are of the 0-4-4-0 classification, and were received from the builder on May 20, 1948. The first and the fourth units are 50 feet 8 inches in length, and are provided with control compartments. The second and the third units are not provided with control compartments, and are 50 feet in length. The total length of the four units coupled is 201 feet 10-1/8 inches. The trucks upon which the traction motors are mounted are of the swing-motion type, and the wheelbase is 9 feet in length. The centers of the trucks of each unit are spaced 39 feet apart. The total weight of the four units in working order is 986,700 pounds. The specified diameter of the driving wheels is 40 inches. Speedometers and speed recorders are provided in each control compartment. All driving-wheel journals are equipped with roller bearings. The center of gravity of each unit is 63 inches above the tops of the rails. The theoretical safe and overturning speeds for these units moving on an 8° curve having a 2-inch super-elevation are, respectively, 42.2 and 71.3 miles per hour.

The Diesel-electric units are provided with 24-RL brake equipment. Pedestal-type automatic brake valves, having rigid handles and locking pins, are arranged on the right side of the control compartments of the first and fourth units. The second and third units are not provided with control compartments but are equipped with conductor's valves. The brake system is arranged with overspeed-control and safety-control features. The latter is so arranged that, when no pressure is exerted upon a diaphragm footpedal, a service application of the brakes will result, unless sufficient air pressure is present in the relay pipe. When the units are coupled for multiple-unit control, the brake equipment of the four units can be controlled by the independent and the automatic brake valves located in one of the control compartments, provided that the double-heading cock on the brake-valve pedestal in the other control compartment is in position for double-heading, the automatic brake-valve handle is locked in running position, and the rotair valve is on the proper lap position. In addition, the several air-hose must be mated with companion hose on adjacent units, and all stop-cocks and angle-cocks at each end of each unit must be in proper position. When so arranged the control valves of each unit are actuated in response to the active brake valve, similar to the control valves on each car of the train. The regulating devices were adjusted for 110-pounds brake-pipe pressure, and 130-140 pounds main-reservoir pressures. An emergency application of the air-brakes cuts off the Diesel power. Each traction-truck is equipped with four brake cylinders, and each wheel is equipped with clasp brakes. These units are also arranged for dynamic braking by utilizing the traction motors and main generator and by absorbing the resultant energy in resistor grids.

The air-brake and the train air-signal equipment of each Diesel-electric unit was cleaned and tested at the builder's plant on May 13, 1948. The last monthly inspection and repairs were completed on June 13, 1948. The last trip inspection and repairs were completed about 6:22 a. m. on the day of the accident. The accumulated mileage was 34,249 miles.

The cars of No. 18 were provided with D-22-AR control valves. The eighth and the ninth cars were equipped with axle-mounted discs located near the inner surface of each wheel for use as braking surfaces. The remainder of the cars were equipped with clasp brakes operating in contact with the treads of the wheels.

Discussion

No. 18 departed from Los Angeles, Calif., 600 miles west of Winslow, at 8 p. m., June 28. The engine crew on the train at the time of the accident went on duty at Seligman. The brakes of this train were tested at Seligman about 6:22 a. m., and the train air-brake system had functioned properly at that point. The train had operated normally up to the time it approached West Winslow. This train had traversed a 3°21' curve to the left 1,047 feet in length, a tangent 489 feet, a spiral curve to the right 189 feet and had just entered an 8° curve to the right when it was derailed. The maximum authorized speed for this train was 100 miles per hour on tangent track and 25 miles per hour on the previously mentioned curves. Prior to the accident the Diesel-electric units and the cars had been riding smoothly.

As No. 18 was approaching the curve on which the accident occurred the speed was 83 miles per hour, as indicated by the speed-recorder tape, and the enginemen were maintaining a lookout ahead from their respective positions in the control compartment at the front of the first Diesel-electric unit. The members of the train crew were in various locations throughout the cars of the train.

The engineer said that between points 16 and 2 miles west of the point of accident the dynamic retarding arrangement was in use to control the speed on the descending grade, and that the throttle was in idling position. At a point about 2 miles west of the point where the derailment occurred, he moved the transition lever from position for dynamic retardation to series position, made a 14-pound brake-pipe reduction with the automatic brake valve, and then released

some brake-cylinder pressure on the Diesel-electric units by use of the independent brake valve. The engineer said he observed by the speed indicator that no retarding effect had resulted from the air-brake application, and that he made another 14-pound brake-pipe reduction at a point about 1.5 miles west of the point of accident. At this time No. 18 was moving on a 1.42 percent descending grade. The two brake-pipe reductions, which were not released, totaled 23 pounds, and reduced the brake-pipe pressure to about 82 pounds. When the engine passed the speed-limit signs, located about 4,800 feet west of the point of derailment, the speed was 83 miles per hour, and he said he placed the automatic brake valve in emergency position and moved the throttle to "off" position. The engineer said that the brake-pipe exhausts following the service and the emergency reductions were of proper duration and volume. The fireman said that, when the speed was not reduced by the service application of the brakes, he called a warning to the engineer, who at that time was moving the brake-valve handle to emergency position. The members of the train crew said they felt a slight application of the brake shoes as the train passed West Winslow, the usual place where a brake application is initiated to reduce speed for the curve on which the derailment occurred, then these employees observed that the speed was not being reduced. The derailment occurred before action could be taken by any member of the train crew to stop the train. The elapsed time between the first brake-pipe reduction and the time of the derailment was about 73 seconds.

Examination of the track throughout a considerable distance westward from the point of derailment disclosed no track condition that could have contributed to the cause of the derailment. The surface, alinement and gage of the track on the spiral and on the curve involved were well maintained for the maximum authorized speed of 25 miles per hour.

The first mark on the track structure was an angular peening of the metal on the outside edge of the top of the head of the north, or high, rail. This mark started at a point 184.5 feet east of the west end of the receiving end of the spiral and continued eastward a distance of 52 feet into the full curvature of 8°. At the east end of this mark, two marks appeared on the earth at points 50 and 72 inches north of the centerline of the eastward main track, and apparently were made by the first unit as it struck the ground. From this point eastward the ground north of the

eastward main track was deeply churned by the derailed equipment. There was no flange mark on the rails or between the rails, and there was no mark on the flanges, the treads, or the side surfaces of the wheels of the Diesel-electric units to indicate that any of these wheels had touched the ground within the limits of the track structure. The calculated overturning speed for the Diesel-electric units at the point of derailment was 71.3 miles per hour. Examination of the speed-recorder tape of the engine indicated that the speed varied between 81 and 83 miles per hour throughout a distance of 14 miles immediately west of the point of derailment, and was 33 miles per hour at that point. There was no indication of any retardation immediately prior to the accident as a result of the brakes being applied. After the accident the speed recorder was tested and found to be accurate. This investigation disclosed no contributing factor or cause other than excessive speed.

Examination of the Diesel-electric units disclosed that the traction-truck assemblies were in good condition, all wheels were tight on their axles and were properly spaced. The throttle lever was in notch No. 1, the first pulling notch back of idling position, the transition lever was in series, the reverse lever was in neutral position, the independent brake valve was in running position, and the automatic brake valve was in emergency position. The automatic brake valves in the front and the rear control compartments and their related retair valves were arranged for control of the air-brake system from the front control compartment. All angle cocks and stop cocks in the various air lines were in position for proper use of the train air-brake system. All brake-pipe hose were removed, and inspection by use of a light and by rolling a 3/4-inch steel ball through them disclosed them to be free of defects. Tests of the air-brake equipment disclosed no condition that would prevent application of the brakes. The travel of the brake-cylinder pistons of the seven undamaged cars was within the requirements of the carrier. All brake shoes throughout the train, except the eighth and the ninth cars, which were equipped with disc brakes, were overheated and considerable metal had been lost as a result of the metal having become softened. The treads of all wheels braked by tread contact, including all the wheels of the Diesel-electric units, bore numerous spots of surface welded brake-shoe metal. These spots were more or less uniformly spaced and varied between 3/4-inch and 1-1/2 inches in diameter and were about 1/32-inch thick. The general car foreman at Winslow said that he had never seen wheels and brake-shoes of passenger-train cars and engines in the same condition as those of No. 18 on the day of the accident.

Cause

It is found that this accident was caused by excessive speed on a curve.

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

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.