

INTERSTATE COMMERCE COMMISSION
WASHINGTON

INVESTIGATION NO. 2697
THE SOUTHERN PACIFIC COMPANY
REPORT IN RE ACCIDENT
NEAR SUTHERLIN, OREG., ON
MAY 8, 1943

SUMMARY

Railroad: Southern Pacific
Date: May 8, 1943
Location: Sutherlin, Oreg.
Kind of accident: Derailment
Train involved: Passenger
Train number: 330
Engine number: 4348
Consist: 8 cars
Estimated speed: 25-35 m. p. h.
Operation: Timetable, train orders and
automatic block-signal system
Track: Single; 8°10' curve; 1.54 percent
descending grade eastward
Weather: Clear
Time: 12:40 a. m.
Casualties: 1 killed; 18 injured
Cause: Accident caused by excessive
speed on sharp curve

INTERSTATE COMMERCE COMMISSION

INVESTIGATION NO. 2697

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

THE SOUTHERN PACIFIC COMPANY

July 9, 1943.

Accident near Sutherlin, Oreg., on May 8, 1943, caused by
excessive speed on sharp curve.

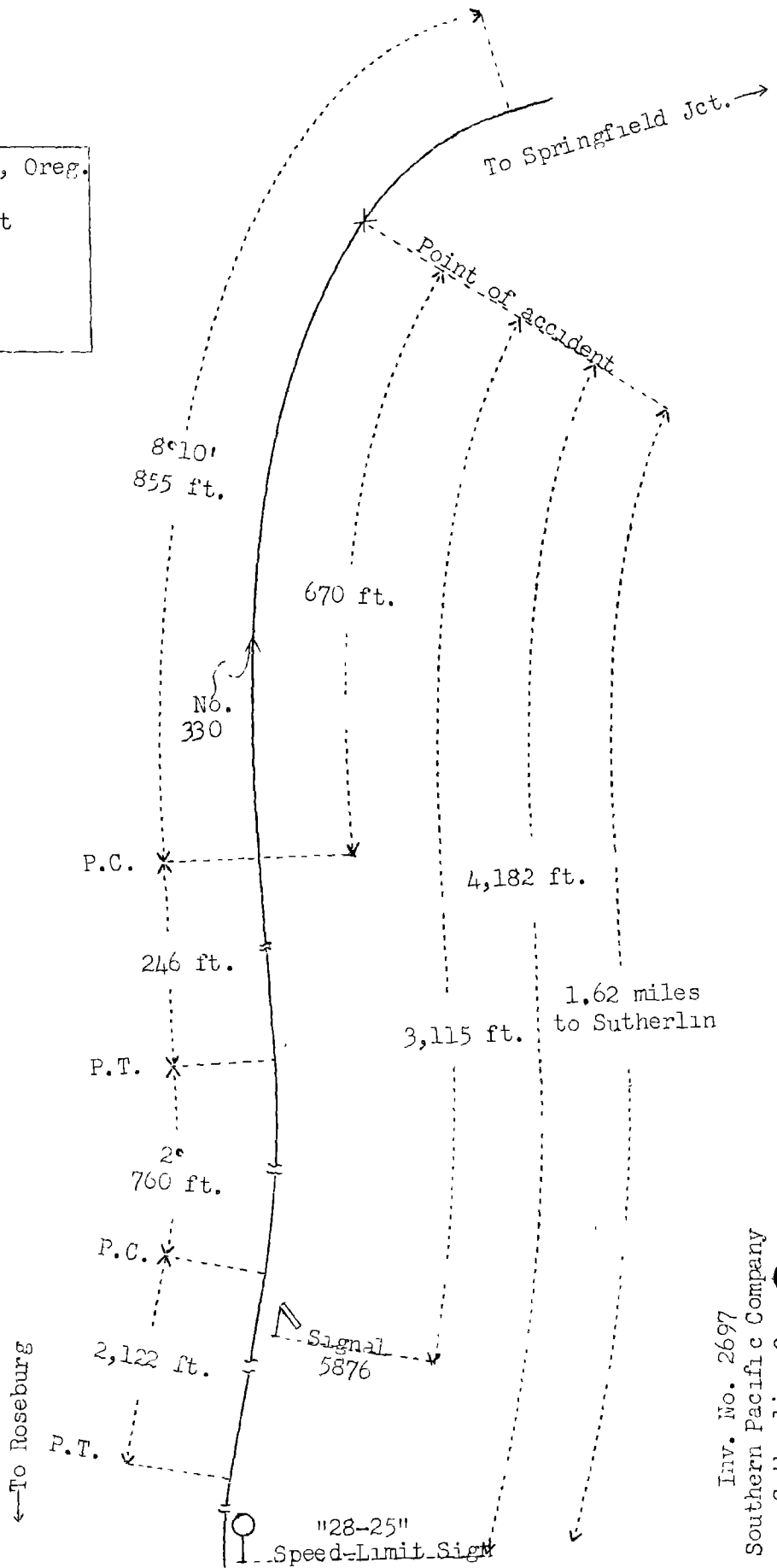
REPORT OF THE COMMISSION¹

PATTERSON, Commissioner:

On May 8, 1943, there was a derailment of a passenger train on the line of the Southern Pacific Company near Sutherlin, Oreg., which resulted in the death of 1 train-service employee and the injury of 15 passengers, 1 railway-mail clerk, and 2 train-service employees. This accident was investigated in conjunction with a representative of the Public Utilities Commissioner of Oregon.

¹Under 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.

○	Springfield Jct., Oreg.	56.28 mi.
X	Point of accident	1.62 mi.
○	Sutherlin	13.80 mi.
○	Roseburg, Oreg.	



Inv. No. 2697
 Southern Pacific Company
 Sutherlin, Oreg.
 May 8, 1943

Location of Accident and Method of Operation

This accident occurred on that part of the Portland Division extending between Roseburg and Springfield Jct., Oreg., 71.7 miles, at a point 1.62 miles east of the station at Sutherlin. 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. Approaching from the west there were, in succession, a tangent 2,122 feet in length, a 2° curve to the left 760 feet, a tangent 246 feet and an 8°10' curve to the right 855 feet. The accident occurred on the last-mentioned curve 670 feet east of its western end. The grade for east-bound trains was, successively, 1.38 percent ascending a distance of 700 feet, 0.12 percent descending 1,700 feet, 1.10 percent descending 1,300 feet, level 1,300 feet, 1.45 percent descending 2,000 feet, and 1.54 percent descending 412 feet to the point of accident and a considerable distance beyond.

On the curve the track structure consisted of 90-pound rail, 59 feet in length, laid new in 1925 on 22 to 24 ties to the rail length. It was fully tieplated, double-spiked, had 8 rail anchors per rail length, and was ballasted with crushed rock to a depth of 8 inches. The superelevation varied between 5-5/8 and 4-1/8 inches and the gage varied between 4 feet 3-1/4 inches and 4 feet 9 inches. At the point of accident the superelevation was 4 inches and the gage 4 feet 8-3/8 inches.

The curve was laid on a hillside cut. At a point 159.5 feet east of the point of derailment and 56 feet horizontally distant, the top of the embankment to the north of the track was 30 feet below the level of the rails.

Automatic signal 5876, which governed east-bound movements, was located 3,115 feet west of the point of accident.

The maximum authorized speed on the curve involved was 28 miles per hour for passenger trains, and 25 miles per hour for other trains. A speed-limit sign bearing the numerals "28-25" was located 4,182 feet west of the west end of the curve.

Description of Accident

No. 330, an east-bound first-class passenger train, consisted of engine 4348, of the 4-8-2 type, one baggage-express car, one baggage car, one mail car, one coach, one coach-lunch car, one coach and two Pullman sleeping cars, in the order named. All cars were of steel construction. After an air-brake test was made this train departed from Roseburg, 13.8 miles west of Sutherlin, at 12:05 a. m., according to the dispatcher's record of movement of trains, on time, departed from Sutherlin at 12:34 a. m., according to the statement of

the conductor, 2 minutes late, passed signal 5876, which displayed proceed, and while moving at a speed variously estimated by surviving members of the train crew as 25 to 35 miles per hour the engine and the first six cars were derailed on an 8°10' curve to the right.

Engine 4348 was derailed to the north and stopped on its left side, down the embankment, 254 feet east of the point of derailment, 56 feet north of the track and at an angle of 45 degrees to it. The engine-truck, the trailer-truck frame, the main engine-frame, the right water column, the left water glass and the cab were broken. The tender was torn loose from the engine and stopped in reverse position against the driving wheels of the engine. The first car stopped upright, down the embankment, against the front end of the engine and practically parallel to the track. Both trucks were detached, the front end was demolished a distance of 28 feet, and the side-sheets, side-sills, end-sills and center-sills were bent. The second car stopped on its left side, badly damaged, down the embankment, 425 feet east of the point of derailment. The third car stopped on its left side at the rear of the second car and at an angle of 45 degrees to it. The roof was demolished a distance of 30 feet and the side-sheets and the end-sheets were torn. The fourth and the fifth cars stopped practically upright, down the embankment and at an angle of 30 degrees to the track. These cars were considerably damaged. The front truck of the sixth car was derailed.

It was clear at the time of the accident, which occurred at 12:40 a. m.

The engineer was killed and the fireman and the front brakeman were injured.

After the accident an inspection of engine 4348 disclosed that the throttle was open 79.4 percent, the reverse lever was in position for 25 percent cut-off in forward motion, and the independent and the automatic brake valves were in running position. The height and the thickness of all flanges were within the prescribed limits. The maximum tread wear was 3/16 inch. The lateral motion and the back-to-back measurements of all wheels conformed to prescribed requirements. The spring rigging was in suitable condition for service. Throughout a portion of its circumference the left No. 4 driving-wheel tire had moved outward from its seat on the wheel-center 1-5/8 inches; however, there was no indication that the tire was loose prior to the derailment or had revolved about its wheel-center. An indentation 1/16 inch deep was on the inner face of the tire. All other tires were tight on the wheel-centers and all wheels and wheel-centers were tight on their axles.

The total weight of engine 4348 in working order was 368,000 pounds. The driving wheels were 73 inches in diameter. The tender was equipped with two six-wheel trucks. Its weight loaded was 291,000 pounds. The rigid wheelbase of the engine was 20 feet long, the total length of the engine and tender was 97 feet 2 inches, and the center of gravity was 78-1/2 inches above the top of the rails. The engine was provided with derailment safety-guards bolted to the pedestals of the engine truck and the trailer truck, and were designed to prevent a derailed engine from leaving the track structure. The last Class 2 repairs were completed December 21, 1940, and the last Class 4 repairs June 24, 1942. The accumulated mileage since the last class repairs were made was 83,154 miles.

According to data furnished by the carrier, the equilibrium, permissive and overturning speeds on an 8° curve having a superelevation of 4 inches and based on a center of gravity of 78-1/2 inches are, respectively, 27, 32 and 66 miles per hour. According to American Railway Engineering Association tables, the equilibrium, comfortable, safe and overturning speeds on an 8° curve having a superelevation of 4 inches and based on an 84-inch center of gravity are, respectively, 28, 37, 42 and 66 miles per hour.

Measurements of 717.55 feet of track immediately west of the point of derailment were as follows:

<u>Distance west of point of derailment</u>	<u>Superelevation</u>	<u>Gage</u>		<u>Curvature</u>
<u>Feet</u>	<u>Inches</u>	<u>Feet</u>	<u>Inches</u>	
717.55	0	4	8-3/4	0
706.55	1/4	4	8-3/4	0
684.55	1/4	4	8-3/8	0
670.55	1/2	4	8-3/8	0
651.55	7/8	4	8-5/8	1°00'
634.55	1-5/8	4	8-5/8	2°07'30"
612.55	1-7/8	4	8-5/8	
595.55	2-1/4	4	8-3/4	4°07'30"
573.55	2-5/8	4	8-3/4	4°30'
556.55	3	4	8-5/8	
534.55	3-3/8	4	8-1/2	6°22'30"
517.55	3-3/4	4	8-1/4	8°07'30"
495.55	4	4	8-1/4	7°37'30"
478.55	4	4	8-1/4	
456.55	4-1/8	4	9	7°45'
439.55	4-1/8	4	8-1/4	
417.55	4	4	8-3/8	7°37'30"
400.55	4	4	8-3/4	

<u>Distance west of point of derailment</u>	<u>Superelevation</u>	<u>Gage</u>	<u>Curvature</u>
<u>Feet</u>	<u>Inches</u>	<u>Feet</u> <u>Inches</u>	
378.55	4	4 8-3/4	10°00'
361.55	4	4 8-5/8	7°15'
339.75	4	4 8-1/4	
323.45	4	4 8-5/8	7°15'
300.85	4	4 8-5/8	
284.25	4	4 8-5/8	8°00'
261.95	4	4 8-5/8	8°45'
245.05	4	4 8-5/8	
223.05	4-1/8	4 8-3/4	7°45'
205.95	4-1/8	4 8-5/8	
184.25	4-1/8	4 8-1/4	7°30'
166.75	4-1/8	4 8-5/8	9°15'
145.35	4	4 8-1/4	
127.75	4	4 8-3/8	7°00'
106.55	4	4 8-3/8	7°00'
89.55	4	4 8-1/2	
67.65	4	4 8-5/8	7°45'
50.35	3-5/8	4 8-3/8	
28.75	3-7/8	4 8-1/4	8°30'
12.25	3-7/8	4 8-3/8	
Point of derailment	4	4 8-3/8	8°30'

The investigation disclosed that the carrier equips all baggage cars with stretchers. First-aid kits are provided on engines, mail cars and Pullman cars. Medical assistance and ambulances arrived about 45 or 50 minutes after the derailment occurred. Bonfires were lighted soon after the accident. Members of the crew and several passengers were provided with flash lights and lanterns to aid them in locating injured passengers, and electric lights of the undamaged cars furnished additional illumination. Passenger trains are not provided with portable telephones.

Discussion

No. 330 was moving on an 8° curve to the right, having a maximum superelevation of 4-1/8 inches, when the engine and the first six cars were derailed to the left at a point where the superelevation was 4 inches and the curvature was 8°30'. The engine overturned and stopped 254 feet beyond the point of derailment. The maximum authorized speed on the curve was 26 miles per hour. The last automatic signal displayed proceed. There was no defective condition of the engine prior to the accident, and there was no indication of dragging equipment,

defective track, or of any obstruction having been on the track.

The fireman said that after departure from Sutherlin, the engineer worked the engine very hard on the ascending grade, a speed of about 45 miles per hour was attained before the train entered the descending grade about 1 mile east of Sutherlin, and as the train was approaching the curve on which the derailment occurred the engineer made two brake-pipe reductions and the speed was about 25 or 30 miles per hour when the engine entered the curve. He did not observe whether the brakes were released, but observed that the throttle remained open according to the usual practice when the brakes are used to reduce speed for sharp curves. The engine was riding smoothly, there was no thrusting or swinging, and he was not alarmed that the train would fail to round the curve safely. The first he knew of anything being wrong was when the engine suddenly overturned to the left. The front brakeman and the conductor said they felt the brakes become applied west of the curve, and the speed was reduced to about 25 or 30 miles per hour at the time of the accident. However, these members of the crew were inside the cars, which were being moved under black-out regulations. The flagman, who was on the rear platform of the rear car, said that when the engine was about 150 feet east of the west end of the curve the speed was about 45 miles per hour, and he felt a service application of the brakes and immediately afterward the brakes released. Although the brakes remained applied only a short time, he thought the speed was reduced to about 35 miles per hour when the derailment occurred. Several railway-mail clerks and several express-company employees observed that the second and third cars lurched from side to side severely several times. An examination after the accident disclosed that the throttle was open 79.4 percent, the reverse lever was in position for 25 percent cut-off in forward motion, and both brake valves were in running position. The brakes had functioned properly en route.

The first mark on the track structure was a tread mark starting on the outside edge of the head of the high rail 572 feet east of the west end of the curve and extending eastward 98 feet. This mark was at an angle of 45° to the top surface of the head of the rail. Immediately beyond it and $14\frac{1}{2}$ inches outside the high rail, a tie was cut to a depth of $\frac{5}{32}$ inch. Increasingly deeper marks appeared on succeeding ties. The mark on the fifth tie eastward was $2\frac{1}{2}$ inches deep and 17 inches outside the high rail. These marks progressed diagonally outward at an angle of about 4° . The derailment safety-guard attached to the left trailer-truck pedestal, $12\frac{1}{4}$ inches outside and 3 inches above the level of the rail, retained splinters from ties. The marks on the ties appeared to have been made by a derailment safety-guard. The mark on

the outside edge of the head of the high rail indicated that the engine was tilted outward at an angle of 45° immediately before the derailment occurred. There was no flange mark on the top of the ties between the high and the low rails. According to A. R. E. A. tables, the overturning speed on this curve is 66 miles per hour, and the maximum safe speed, 42 miles per hour. Between any two adjacent stations approximately 17 feet apart, the greatest variation in gage was $3/4$ inch, and in surface $3/8$ inch. The curvature was specified as 8° , but it varied between $7^{\circ}15'$ and 10° . The super-elevation varied between $3-5/8$ and $4-1/8$ inches. Considering the fact that the engine was derailed to the high side of the curve without marking the track structure between the rails, it appears the train was moving at overturning speed when the derailment occurred. The irregularities in alinement and gage would cause the engine to pivot and to roll laterally. Evidently the speed and the irregularities in the alinement and gage were sufficient to cause the engine to overturn to the outside of the curve and the estimates given by the members of the crew were considerably lower than the actual speed. The engineer was experienced and familiar with the territory involved. As he was killed in the accident it could not be determined why action was not taken to control the speed of the train in accordance with the speed restriction on the curve.

Cause

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

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

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,
Secretary.