

INTERSTATE COMMERCE COMMISSION  
WASHINGTON

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INVESTIGATION NO. 2502  
THE SOUTHERN PACIFIC COMPANY  
REPORT IN RE ACCIDENT  
AT TRUCKEE, CALIF., ON  
MAY 10, 1941.

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-2-

## SUMMARY

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Railroad: Southern Pacific  
Date: May 10, 1941  
Location: Truckee, Calif.  
Kind of accident: Derailment  
Train involved: Freight  
Train number: Extra 4132 East  
Engine number: 4132  
Consist: 71 cars, caboose  
Speed: 18-22 m.p.h.  
Operation: Timetable, train orders and  
automatic block-signal and  
automatic train-stop system  
Track: Double; 3°55' curve; 1.72 percent  
descending grade eastward  
Weather: Clear  
Time: About 2:55 a.m.  
Casualties: 1 killed; 1 injured  
Cause: Accident caused by broken wheel

INTERSTATE COMMERCE COMMISSION

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INVESTIGATION NO. 2502

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

THE SOUTHERN PACIFIC COMPANY

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July 5, 1941

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Accident at Truckee, Calif., on May 10, 1941, caused by broken  
wheel.

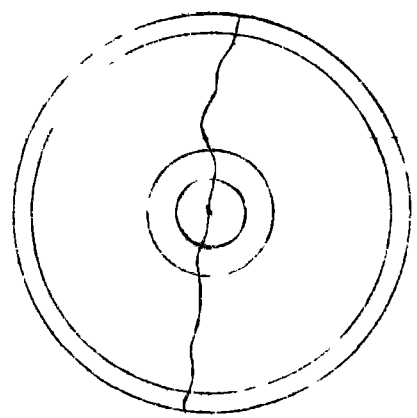
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REPORT OF THE COMMISSION<sup>1</sup>

PATTERSON, Commissioner:

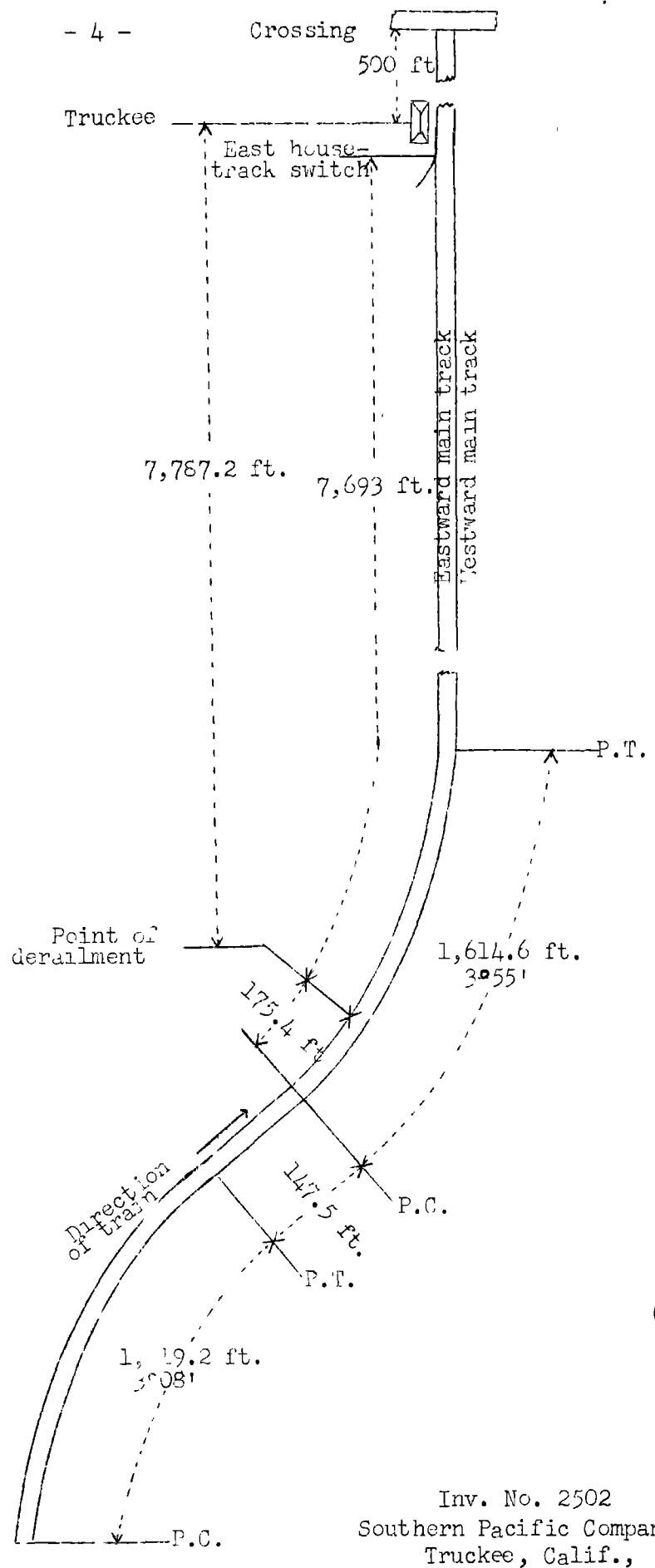
On May 10, 1941, there was a derailment of a freight train on the line of the Southern Pacific Company at Truckee, Calif., which resulted in the death of one employee and the injury of one employee. This accident was investigated in conjunction with the Railroad Commission of California.

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<sup>1</sup>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.



Sketch showing location of rupture.

↑  
Sparks



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|----------------------|----------|
| o Sparks, Nev.       | 38.2 mi. |
| o Truckee, Calif.    | 1.3 mi.  |
| X Point of accident  | 6.1 mi.  |
| o Andover            | 8.6 mi.  |
| o Norden             | 85.4 mi. |
| o Roseville          | 17.7 mi. |
| o Sacramento, Calif. |          |

↓  
Sacramento

Inv. No. 2502  
Southern Pacific Company  
Truckee, Calif.,  
May 10, 1941.

### Location and Method of Operation

This accident occurred on that part of the Sacramento Subdivision of the Sacramento Division which extends between Sacramento, Calif., and Sparks, Nev., a distance of 157.3 miles. In the vicinity of the point of accident this is a double-track line over which trains are operated by timetable, train orders, and an automatic block-signal and automatic train-stop system; the current of traffic is to the left. The derailment occurred on the eastward main track at a point 7,787.2 feet west of the station at Truckee. As the point of accident is approached from the west there is a series of curves and tangents followed, in succession, by a 3°08' curve to the right 1,819.2 feet in length, a tangent 147.5 feet, and a 3°55' curve to the left 1,614.6 feet. The derailment occurred on the latter curve at a point 175.4 feet from its western end. At the point of accident the grade for east-bound trains is 1.72 percent descending.

The track structure consists of 110-pound rails on tangents and 130-pound rails on curves, 39 feet in length, laid on 24 treated ties to the rail length; it is double-spiked, fully tieplated, laid on 3 inches of gravel, and is well maintained.

The maximum authorized speed for the train involved is 20 miles per hour.

The weather was clear at the time of the accident, which occurred about 2:56 a.m.

### Description

Extra 4132 East, an east-bound freight train, with Conductor Mitchell and Engineman Robinson in charge, consisted at the time of the accident of engine 4132, 71 loaded cars and a caboose. This train, assisted by a helper engine, departed from Roseville, 101.4 miles west of Truckee, at 6:40 p.m., May 9, according to the train sheet. A second helper engine was added at Colfax, 66.3 miles west of Truckee, and the train departed at 8:48 p.m. It arrived at Norden, 16 miles west of Truckee and the last open office, at 1:35 a.m. Both helper engines were detached and the train departed at 1:55 a.m. It stopped at Andover, 7.4 miles west of Truckee, at 2:25 a.m. for inspection of the cars, departed at 2:35 a.m., and was derailed near the station at Truckee while moving at a speed estimated as 18 to 22 miles per hour.

The engine and first ten cars were not derailed and the engine stopped 11,298 feet east of the first mark of derailment. The front wheels of the rear truck of the eleventh car were

derailed and the car moved in this condition throughout a distance of 7,600 feet, then the eleventh to twenty-first cars, inclusive, became totally derailed and stopped, badly damaged, at various angles to the track. The derailed cars stopped within a space of 900 to 1,200 feet to the rear of the engine.

The employee killed was the fourth brakeman and the employee injured was the front brakeman.

#### Summary of Evidence

Engineman Robinson stated that at Roseville a terminal air-brake test was made, several tests were made at points en route, and the brakes functioned properly. On the descending grade between Norden and Truckee he controlled the speed of his train to about 20 miles per hour by making several 8-pound brake-pipe reductions and releasing the brakes after each reduction. The train was stopped about 10 minutes at Andover for inspection of its cars. On several occasions he looked back over his train and did not observe any unusual condition. Soon after his engine passed the station at Truckee he released the brakes. When his engine was about 500 feet east of the station he observed that the air pressure was being depleted and, thinking that his train had parted, he opened the throttle to prevent the rear portion from overtaking the front portion. After the engine stopped he proceeded back to examine the cars. He found that the front axle of the rear truck of the eleventh car, P. F. E. refrigerator car 97333, was driven into the end of that car and the right wheel was missing. The rear axle and the wheels of this truck had plowed into the roadbed and were half buried in the ground. About 30 minutes after the accident occurred he placed his hand on the axles and the remaining wheels of the truck involved and there was no evidence of abnormal heat. The accident occurred about 2:56 a.m.

Fireman Swain corroborated the statement of his engineman in all essential details.

Front Brakeman Wall stated that at Norden he assisted in setting retaining valves for use. At Andover he inspected the first 24 or 25 cars in the train and there was no evidence of overheated wheels or of any dragging equipment. As his train was descending the grade into Truckee the fourth brakeman and he were stationed on top of the twentieth or twenty-first car. The front brakeman said that on numerous occasions he looked forward and backward over the train on both sides and observed no evidence of sticking brakes or overheated wheels, or of anything being dragged. The first he knew of anything being wrong was when he observed a man on the ground waving stop

signals and shouting to him. At this time the fourth brakeman and he were on the same car. The accident occurred immediately afterward.

Swing Brakeman Marling stated that at Norden, accompanied by the fourth brakeman, he walked on the left side from the caboose to the twenty-first car and inspected that portion of the train; when the train was departing he again inspected those cars as they moved by him. He observed no indication of sticking brakes, overheated wheels or of anything being dragged. About 15 minutes after the accident occurred he placed his hand on the axles and the wheels of the rear truck of the eleventh car and there was no evidence of excessive heat.

Conductor Mitchell stated that at Roseville a terminal air-brake test was made, several stops were made en route, and the brakes functioned properly. Emergency hose were located about every twenty cars in the train. At Norden he instructed the brakemen to set 56 or 57 retaining valves for use. He said that according to time-table instructions a 10-minute stop at Norden is required to allow wheels and tires to cool. The train was inspected for overheated wheels and there was no evidence of excessive heat. As the train departed from Norden the fourth brakeman inspected the cars from the engine to the caboose as they moved by him and reported to the conductor that everything was all right. The conductor said that he and the flagman observed the train as it proceeded down the grade and there was no evidence of anything unusual. It was moonlight and the weather was clear at the time of the accident, which occurred about 2:56 a.m.

Flagman Corey stated that as his train was approaching the point where the accident occurred he was seated in the rear of the caboose maintaining a lookout to the rear. Two lanterns were provided to illuminate the track to the rear of the caboose, but it was difficult to distinguish marks on the track. The first he knew of anything being wrong was when the train began to stop at Truckee; at that time he observed marks on the ties to the rear of the caboose.

Pumper Wilson, at Truckee, stated that as the engine of Extra 4132 passed him at a crossing about 500 feet east of the station, he heard a noise and observed fire and sparks flying from the eleventh car. When this car moved on the crossing it broke away from the train and the general derailment occurred immediately afterward.

Police Officer Pfaendler, at Truckee, stated that he was in the yard at Truckee as Extra 4132 approached. He observed fire flying from the eleventh car and waved and shouted a warn-

ing to a brakeman who was on the eleventh or twelfth car.

Instrumentman Hornor stated that the first mark of derailment was a flange mark about 12 inches inside the north rail on a tie 7,787.2 feet west of the station. Throughout a distance of 150 to 200 feet east of the first mark of derailment flange marks continued on the ties from 12 to 14 inches inside the north rail. At a point 60 feet east of the first mark of derailment one-half of a broken wheel was found between the rails and at a point 40 feet farther east the other half was found outside the south rail. Throughout a distance of 7,600 feet to the frog of the east house-track switch, located about 100 feet west of the station, ties were torn and gouged by a wheel being dragged at right angles to the track. At the frog of the east house-track switch the remaining wheels of the truck climbed the rails and the general derailment followed.

Roadmaster Pearson stated that he arrived at the scene soon after the accident occurred. He inspected the track and found the first mark of derailment on a tie at a point 7,787.2 feet west of the station. He observed both portions of the broken wheel about 60 feet east of the first mark of derailment. One piece was between the rails of the eastward main track and the other was between the two main tracks. The ties were marked progressively deeper throughout a distance of 7,693 feet from the first mark of derailment to the frog of the east house-track switch. Within this distance the head of the rail was burned at numerous places. At the point of derailment the track was in proper gage, surface and alinement.

Car Inspectors Hatler and May, at Roseville, stated that they conducted a terminal air-brake test on Extra 4132 East at that point. The brakes applied and released properly.

Master Car Repairer Bartle stated that he inspected the derailed equipment. The front pair of wheels of the front truck of P. F. E. 97333 bore evidence of excessive heat; grease on the rear wheels of this truck indicated that they had not been so hot as the front pair. The right front wheel of the rear truck of this car was broken. He inspected the two portions of the broken wheel involved. There was no grease on either portion and the tread was blued from having been overheated. There were numerous thermal checks on the tread. The wheel had broken through one of these checks, which was about 1/2 inch deep. There was no old fracture in the plate but there were two old fractures in the hub of the wheel; one extended inward from the journal box a distance of 1 inch and the other extended inward from the other side a distance of 2 inches. It was his opinion that the old fractures in the hub did not contribute to the rupture of the wheel. The fracture involved



was all new. He said that although the wheel-fit on the axle was very poor, there was no indication that the wheel had turned on the axle. It was not possible to obtain wheel-press data concerning the wheel involved because records prior to a period of 3 years are not kept by the owners of the car. In his opinion the accident was caused by a broken wheel as a result of overheating. The brake levers were found to conform with the badge plate on the car. Because of the damaged condition of the car he could not determine if the hand brake was applied when the accident occurred. It was not possible to reassemble the brake shoes involved. He said that the overheating may have been caused by unequal brake-shoe application, by difference in thickness of brake shoes, or by an obstruction in the retaining-valve pipe.

Car Foreman Jones corroborated the statement of Master Car Repairer Bartle in all essential details, except that he stated there was some grease on the companion wheel of the broken wheel and that the only indication of the wheel having been hot was a blue strip  $1/4$  inch wide on the entire length of the tread.

Test Rack Operator Fritz, of the Pacific Fruit Express Company, stated that he tested the K-2 triple valve and the retaining valve removed from the eleventh car. They functioned as intended.

Engineer of Tests Noyes conducted a test of the broken wheel. The report covering the test states that the wheel was a single-plate, cast iron wheel, manufactured on December 19, 1933, by the New York Car Wheel Company. The wheel weighed 700 pounds, bore number 84459, and its contour conformed to A. R. A. 1928 single-plate specification. The depth of chill at the tread was  $11/16$  inch, tape 2; there was some tread wear but the wear was within the prescribed limits. The break extended diametrically through the hub. The tread and the face of the flange were blueed from heat and the tread was heat-cracked. The fracture disclosed porosity in the hub adjacent to the outside face and the region of the fillet between the rim and the plate. Chemical analysis of the wheel and the corresponding A. A. R. M-403-39 specifications are as follows:

	<u>Wheel 84459</u>	<u>A. A. R. M-403-39</u>
Total Carbon	3.350 percent	Min. 3.00 percent
Graphitic carbon	2.680 percent	
Combined carbon	.670 percent	Max. 0.90 percent
Manganese	.505 percent	Min. 0.50 percent
Phosphorous	.308 percent	Max. 0.35 percent
Sulphur	.178 percent	Max. 0.14 percent
Silicon	.600 percent	

The report states also that the analysis of the metal reveals a rather high sulphur and manganese content at the lowest limit, which is a contributing factor in the breaking of a wheel because of the presence of thermal checks. The desired manganese content is  $3\frac{1}{2}$  times the sulphur content. It was his opinion that the wheel was broken as a result of overheating. Tests of the other wheels of the eleventh car disclosed evidence of overheating and thermal checking of the treads.

According to data furnished by the carrier, the capacity of P. F. E. 97333, a refrigerator car, is 70,000 pounds. At the time of the accident the car was loaded with lettuce. The weight of the contents was about 24,000 pounds and the total weight of car and contents was 90,000 pounds.

#### Observations of the Commission's Inspectors

The Commission's inspectors observed that the first mark of derailment was a flange mark on a tie about 14 inches inside the north rail. The car involved was of steel underframe and wooden superstructure construction equipped with Bettendorf U-section trucks, Universal geared hand-brake and K-2 triple valve. The triple was last cleaned on March 19, 1940. The car was built in 1926 and was reconditioned in March 1941. The inspectors observed an old fracture which covered about 35 percent of the cross-sectional area of the hub and appeared to be in the line of the failure.

#### Discussion

According to the evidence, Extra 4132 East was approaching Truckee at an estimated speed of 18 to 22 miles per hour when the eleventh car was derailed at a point about 1.4 miles west of the station at Truckee. The front wheels of the rear truck were the only wheels derailed until this car reached a frog near the station and then the other wheels of this car and the twelfth to twenty-first cars, inclusive, became derailed.

The first indication of an abnormal condition was a flange mark on a tie about 14 inches inside the north rail. The track

at this point was in proper gage, surface and alinement. Examination made soon after the accident occurred disclosed that the right front wheel of the rear truck of the eleventh car was broken into two almost equal portions, one of which was found between the rails of the eastward main track at a point about 60 feet east of the first mark of derailment and the other was between the two main tracks a short distance east of the first portion. The companion wheel remained on the axle but was dragged on the ties to the point where the general derailment occurred.

A terminal air-brake test was made at the initial station and the brakes were tested several times en route. When the cars were inspected at points 14.6 and 6 miles west of the point of accident the crew found no defect. They were maintaining a lookout over the train as it approached the point where the accident occurred and none of them knew of the abnormal condition until just before the general derailment occurred.

The broken wheel was of cast iron and was pressed on its axle in 1933. The testimony regarding the condition of the wheel immediately before the accident occurred varied considerably. All witnesses who examined the truck involved immediately after the accident occurred said the companion wheel was no hotter than would normally be expected under the usual braking practices. Later, when other witnesses examined the broken wheel and the other wheels of that truck, some of them thought one or two of the wheels had been excessively hot because the treads were blued and because they did not see any grease on the wheels, but other witnesses thought there had been no excessive heat because they saw grease on the wheels and very little blued condition. There were numerous thermal cracks in the tread and the fracture passed through one of the thermal cracks, which was about 1/2 inch deep. There were two old cracks in the hub and there was some testimony that the fracture passed through one of these cracks and other testimony to the effect that it did not pass through this point. According to the report of the engineer of tests, the failure of the wheel was the result of overheating combined with a relatively high sulphur content in the metal. Some witnesses thought the wheel-fit was not good. According to Wheel and Axle Manual of the Association of American Railroads, a radial crack in the hub of a cast iron wheel usually develops at the wheel press because of improper mounting such as excessive pressure from improper fit allowances or gouging, excessively hard hubs which sometimes occur in wheels with improper annealing at the foundry, or the improper fit allowances resulting from the use of lubricants of the wrong consistency. The

records covering the pressing of the wheel on the axle are not available as the owners of the car involved do not retain such records longer than 3 years.

Cause

It is found that this accident was caused by a broken wheel.

Dated at Washington, D. C., this fifth day of July, 1941.

By the Commission, Commissioner Patterson.

(SEAL)

W. P. BARTEL,

Secretary.