

INTERSTATE COMMERCE COMMISSION  
WASHINGTON

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REPORT OF THE DIRECTOR  
BUREAU OF SAFETY

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ACCIDENT ON THE  
UNION PACIFIC RAILROAD

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HOUSTON, COLO.

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JANUARY 14, 1940

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INVESTIGATION NO. 2405

- 2 -

SUMMARY

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Inv-2405

Railroad:	Union Pacific
Date:	January 14, 1940
Location:	Houston, Colo.
Kind of accident:	Derailment
Train involved:	Passenger
Train number:	4
Engine number:	817
Consist:	8 cars
Speed:	65-67 m. p. h.
Operation:	Timetable, train orders and automatic block system
Track:	Single; tangent; 0.50 percent ascending grade for eastward movements
Weather:	Clear
Time:	10:40 a. m.
Casualties:	16 injured
Cause:	Broken wheel

March 8, 1940.

To the Commission:

On January 14, 1940, there was a derailment of a passenger train on the Union Pacific Railroad at Houston, Colo., which resulted in the injury of 11 passengers, 1 Pullman employee, 3 dining-car employees, and 1 employee off duty. This investigation was made in conjunction with a representative of the Public Utilities Commission of Colorado.

#### Location and Method of Operation

This accident occurred on that part of the Colorado Division designated as the Northern Subdivision which extends between Denver, Colo., and Cheyenne, Wyo., a distance of 106 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 system. Time-table directions are used in this report. At Houston a siding 2,200 feet in length parallels the main track on the south; the derailment occurred at a point 20 feet 5 inches east of the point of frog of a No. 10 turnout at the east end of this siding. Approaching this point from the west the track is tangent for several miles and some distance beyond. The grade for east-bound trains is 0.50 percent ascending at the point of accident.

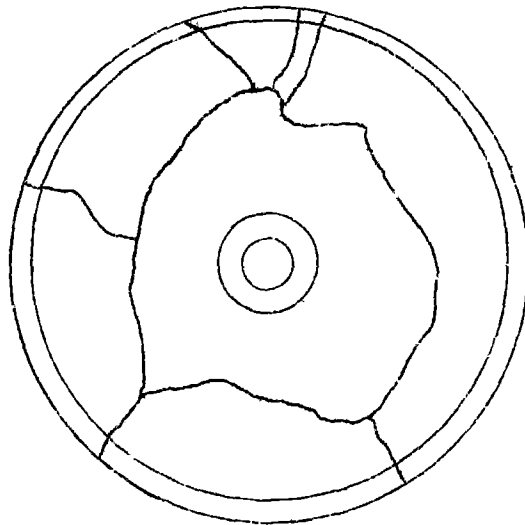
The track structure consists of 110-pound rail, 39 feet in length, laid on 22 ties to the rail length; it is single-spiked, fully tieplated, ballasted with gravel to a depth of 12 inches, and is well maintained.

The maximum authorized speed for passenger trains in the vicinity of the point of derailment is 70 miles per hour.

The weather was clear and there was a light snow on the ground at the time of the accident, which occurred at 10:40 a. m.

#### Description

No. 4, an east-bound passenger train, with Conductor Cross and Engineman Lewis in charge, consisted of engine 817, one mail car, two baggage cars, one coach, one Pullman tourist car, one coach, one Pullman sleeping car, and one cafe lounge car, in the order named; all cars were of steel construction. This train departed from Cheyenne, Wyo., 68.2 miles west of Houston, at 9 a. m., according to the train sheet, 1 hour late, passed La Salle, 8.3 miles west of Houston, at 10:30 a. m., 1 hour late, and, while moving at a speed estimated to have been



Sketch showing location of ruptures.

HOUSTON

o Chevenne, Wyo.
54.3 mi.
o Greeley, Colo.
5.6 mi.
o LaSalle
8.3 mi.
o Houston (P. of A.)
37.8 mi.
o Denver, Colo.



To  
Chevenne



Direction  
of train



2,200 ft.



Point of accident

To  
Denver



Inv. No. 2405  
Union Pacific R.P.  
Houston, Colo.  
Jan. 14, 1940

65 or 67 miles per hour, became derailed at the east siding-switch at Houston.

The engine and first four cars were not derailed; they stopped, coupled, 3,764 feet east of the point of frog of the east siding-switch. The fifth car was derailed to the north and stopped upright on the ties at a point 1,681 feet east of the point of derailment; this car was slightly damaged. The sixth car was derailed to the south and stopped on its side at a point 865 feet east of the point of derailment with its front end near the south rail and the rear end 25 feet 9 inches from the center-line of the track; this car was considerably damaged. The seventh and eighth cars became derailed to the south and stopped, coupled, practically parallel to the track, 646 and 565 feet, respectively, east of the point of derailment; these cars were considerably damaged.

#### Summary of Evidence

Engineman Lewis stated that a terminal air-brake test was made at Cheyenne and the brakes functioned properly en route. Approaching Houston his engine was riding smoothly and he estimated that the speed of his train was 65 miles per hour. The first indication of trouble was when he felt a severe jerk from the rear of the train; at that time his engine was about 250 or 300 feet east of the east siding-switch at Houston. The brakes became applied in emergency and he placed the brake valve in lap position. He had made visual inspection of his train on all curves en route and everything appeared to be normal. He said the accident occurred at 10:40 a. m. Immediately after the train stopped he went back to ascertain the cause of the accident. He observed that the right, or south, front wheel of the six-wheel truck at the rear of the fourth car, coach 1224, was broken. The hub and a rough circular portion of the plate remained on the axle; all of the rim and portions of the plate were missing. He placed his hand on the remaining portion of the wheel to determine if it were overheated and found there was no excessive heat. The broken wheel was held suspended over the rail by the remaining wheels of the truck which were not derailed. He found a piece of the broken wheel, which comprised about half of it, to the south of the track and about 450 or 500 feet east of the point of derailment. All fractures appeared to be new.

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

Conductor Cross stated that when approaching Houston he was in the fourth car at which time the speed of the train was 65 or 67 miles per hour. The first indication he had of anything being wrong was a sudden, rough motion of the car; he immediately pulled the conductor's emergency brake-valve and,

glancing out the window, saw that the car was passing the east siding-switch at Houston. He said that after the train stopped he was busy with rescue work and did not observe the broken wheel or the condition of the track. The accident occurred at 10:40 a. m.

Front Brakeman Cope stated that when approaching Houston the speed was 65 miles per hour. He was in the rear of the fourth car and the first indication he had of anything being wrong was a jolting motion of the car when passing the east siding-switch. Immediately afterward the train parted at the rear of the fourth car and the rear four cars became derailed. Some time later he examined the track and the east siding-switch; there was no mark west of the point of frog of the switch. East of the point of frog there were marks indicating that a wheel had dropped off the rail; the track was considerably torn up at that point. No indication of overheated parts or of equipment having been dragged was observed en route to Houston.

Rear Brakeman Majors stated that approaching Houston he was in the seventh car and, as it passed Houston, there was a sudden, jolting motion and the car became derailed. After the accident he walked over the east siding-switch and observed nothing that might have caused the accident.

Mechanic Foreman Nicholls stated that he was at La Salle when No. 4 stopped en route to Houston and at that time engine 817 was inspected and no defect was found. A running inspection of the train was made as it passed him and he observed no indication of dragging equipment, sticking brakes, or overheated parts. He arrived at the scene of derailment about 11 a. m. and inspected the east siding-switch; the frog was marked and damaged, and several rails east of the frog were turned over. Three segments of the broken wheel were found to the south of the track and about three or four pole spaces from the point of frog. These segments were of nearly equal size and comprised approximately one-half of the rim of the broken wheel. Some time later a small triangular piece of the rim of the broken wheel was found about three pole spaces east of the frog and to the south of the track. Finally all the pieces were recovered and all fractures appeared to be new. He did not observe any defect in the track or the wheel segments that might have contributed to the cause of the accident.

Car Foreman Willman stated that No. 4 en route to Houston, was inspected at Greeley and no defect was found. He arrived at the scene of the accident about 11:35 a. m. He corroborated the statement of Mechanic Foreman Nicholls in all essential details.

Master Mechanic Norton stated that he inspected the track from a point about 1/2 mile west of the east siding-switch at Houston to the point of derailment. There was no mark on the track or roadbed to indicate equipment having been dragged. East of the east siding-switch there were several pieces of broken rail; the switch point was broken and out of place; there was considerable damage to the track east of the switch points. There was a mark on the head of the south rail at the switch, indicating that a flange of a wheel had run over the head and dropped on the track bolts.

General Car Foreman Schroeder arrived at the point of derailment about 1:15 p. m. He examined the broken wheel on the fourth car; there was no indication of parts having been overheated and all fractures appeared to be new. Fresh tool marks on the wheel indicated to him that it had recently been turned down. No old defective condition of the remaining wheels or of the truck frame could be found.

Roadmaster Melody stated that he inspected the switch involved on December 6, 1939; no defect was observed at that time. En route to the scene of accident he inspected the track from a point about 1/2 mile west of Houston to the point of derailment. No indication of equipment having been dragged was found. A slight mark was observed at the point of frog of the east siding-switch at Houston, the heel filler-block at the switch was broken, the angle bar on the inside of the switch point was broken, and the heel of the switch point was broken through a bolt hole where the switch-point clips are fastened. A short piece of rail, showing new breaks on each end, was found to the south of the track. All fractures observed were new and clean; no indication was found of any defective condition of the rails which might have caused the derailment.

Division Engineer Pitts stated that he arrived at the point of derailment during the afternoon of the day of the accident. At a point 19 feet 9 inches east of the point of frog there were two parallel marks gouged in the head of the south rail; these were marks such as would be made by a broken wheel; 8 inches east of these marks, or 20 feet 5 inches from the point of frog, a mark on the outside edge of the rail indicated that a wheel had left the rail; 29 feet 4 inches east of the point of frog there was a wheel mark on a tie on the north side of the track; 6-1/2 inches west of the switch point a mark on the south rail indicated that a wheel had mounted the rail, and there was a corresponding mark on the inside of the north companion rail; just east of the switch points, marks were observed on the inside of the south rail and on the outside of the north companion rail; these marks continued to a point 1,681 feet east of the point of frog. There were marks on the ties east of the switch points on the inside of the north rail and on the outside of the south rail to points

where the fifth and sixth cars were derailed. He said that the initial point of derailment was 20 feet 5 inches east of the point of frog.

Data and photographs furnished by the Research and Mechanical Standards Department of this railroad disclosed that the broken wheel, which was the front wheel of the rear truck of coach 1224, the fourth car in No. 4, was a rolled steel wheel, manufactured in 1928 by the Standard Steel Works Company and bore the following markings: Anchor S Anchor 901 H A 3363 C-70 5-23-28 R S 62091 S P Co. This wheel was applied to coach 1224 at West Oakland, Calif., by the Southern Pacific Company, on November 10, 1939.

Chemical analysis of the steel, which conforms to Specification CS-51, is as follows:

Carbon	0.72 percent
Manganese	0.82 "
Phosphorus	0.039 "
Sulphur	0.024 "
Silicon	0.27 "

The metal appeared sound and of uniform structure. The structure of the metal at the middle of the tread was slightly altered as a result of brake-shoe friction and numerous light thermal checks appeared in this area. The break occurred circumferentially in the plate, starting on the flange side, as indicated by the direction of the rupture; the entire rim was broken from the hub portion and was fractured into five pieces; all fractures were clean. On a 4-inch triangular piece of rim there was a deep transverse cut about 2-3/4 inches in length on the tread and a deep semi-circular nick on the inner side of the flange; this nick fitted the contour of a 110-pound rail-head. A deep scar on the transverse section of the plate of the wheel indicated that this piece may have acted as a fulcrum between the broken rail and the heel block, and the wheels of the following cars. Measurements showed a maximum rim thickness of 1-3/32 inches and a minimum of 1 inch. The contour of the flange was normal and the maximum tread wear was 9/64 inch. The conclusion of the Research and Mechanical Standards Department was that the wheel was broken because of internal residual stresses in the plate; also, that the wheel approached A. A. R. condemning limits for wear.

#### Observations of the Commission's Inspectors

The Commission's inspectors arrived at the scene of the accident after the wreckage had been cleared and the track had been repaired; however, there remained definite marks indicating the point of derailment. The first mark found was a gouge



in the top of the right rail at a point 19 feet 9 inches east of the point of frog at the east end of the siding; 8 inches farther east, marks south of the right rail indicated the initial point where wheels had dropped off the rail; at a point 29 feet 4 inches east of the point of frog and south of the left rail wheel marks appeared on the ties. Marks 6-1/2 inches east of the heel of the right switch-point and corresponding marks on the opposite rail indicated that wheels which had been derailed had been raised at the heel blocks and rerailed at this point. As a result of the rerailment, the right heel block was broken and the heel of the right switch-point was broken and forced out of position, forming a derail for the following cars. There was no mark west of the point of derailment indicating equipment having been dragged.

The inspectors examined all parts of the broken wheel and found all fractures to be new and clean; there was no indication that the wheel had been hot.

Vice President Jabelman, in charge of research and standards of this railroad, advised the Commission's inspectors that, as a result of this accident, the Union Pacific has changed its standard for the thickness of the treads of rolled steel wheels from a minimum of 1 inch to a minimum of 1-1/4 inches for conventional equipment and a minimum of 1-3/8 inches for streamlined equipment.

#### Discussion

According to the evidence, No. 4 approached Houston at an estimated speed of 65 or 67 miles per hour and, when the engine was 250 or 300 feet east of the east siding-switch at Houston, the cars to the rear of the fourth car became derailed. The switch was a trailing-point switch for eastward movements. Examination subsequent to the accident disclosed that the front wheel on the south side of the rear truck of coach 1224, the fourth car, was broken. The first indication of an abnormal condition was a gouge mark on the top of the right rail 19 feet 9 inches east of the point of frog and the first mark of derailment was 8 inches farther east; these facts indicate that the wheel broke at the gouge mark. West of the point of derailment there was no evidence of equipment having been dragged or of any abnormal track condition. This broken wheel caused the truck to become derailed to the south at the switch; then this truck became rerailed at the heel block at the heel of the switch points and, in the process of rerailing, the heel of the south point was broken and forced out of line; this condition resulted in the remainder of the train becoming derailed.

Examination of the broken wheel disclosed that all five fractures were new and no evidence of any old defect was found.

The analysis of the metal in the wheel revealed that the chemical composition met the requirements of the specification for rolled steel wheels. Measurements of various points of the circumference of the wheel showed a maximum tread thickness of 1-3/32 inches and a minimum thickness of 1 inch. Contour of the flange was normal. There was no indication of recent overheating. After the occurrence of this accident the railroad changed the standard for tread thickness of rolled steel wheels from a minimum of 1 inch to a minimum of 1-1/4 inches for conventional equipment, and a minimum thickness of 1-3/8 inches for streamlined equipment.

The broken wheel approached A. A. R. condemning limits for wear. Apparently this accident was caused by stresses present in the plate of the wheel which overcame the band resistance of the rim and resulted in the rupture of the wheel.

#### Conclusion

This accident was caused by a broken wheel.

Respectfully submitted,

S. N. MILLS,

Director.