Inv-2031

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT OF THE DIRECTOR

BUREAU OF SAFETY

ACCIDENT ON THE

NEW YORK CENTRAL RAILROAD

CARTER, N.Y.

JANUARY 5, 1936

INVESTIGATION NO. 2031

SUMMARY

Railroad:	New York Central
Date:	January 5, 1936
Location:	Carter, N. Y.
Kind of accident:	Derailment
Train involved:	Freight
Train number:	Extra 2149
Engine numbers:	2149 and 5181
Consist:	26 cars and caboose
Speed:	30 m.p.h.
Track:	4° portion of long compound curve; grade 0.58 percent ascending
Weather:	Light snow falling
Time:	8:15 p.m.
Casualties:	1 killed and 1 injured
Cause:	Broken wheel

March 16, 1936.

To the Commission:

On January 5, 1936, there was a derailment of a freight train on the New York Central Railroad near Carter, N. Y., which resulted in the death of 1 employee and the injury of 1 employee.

Location and method of operation

This accident occurred on that part of the Adirondack Division extending between Remsen and Malone, N. Y., a distance of 145.64 miles, and is a single-track line over which trains are operated by time table, train orders and a manual block-signal system. The accident occurred approximately 1 mile south of the station at Carter, on a compound curve to the left 4,028 feet in length, consisting of a 2° curve for a distance of 2,513 feet and then a 4° curve for a distance of 1,515 feet, the accident occurring on the latter portion of the curve at a point 752 feet from its northern end. The grade for north-bound trains is 0.58 percent ascending at the point of accident.

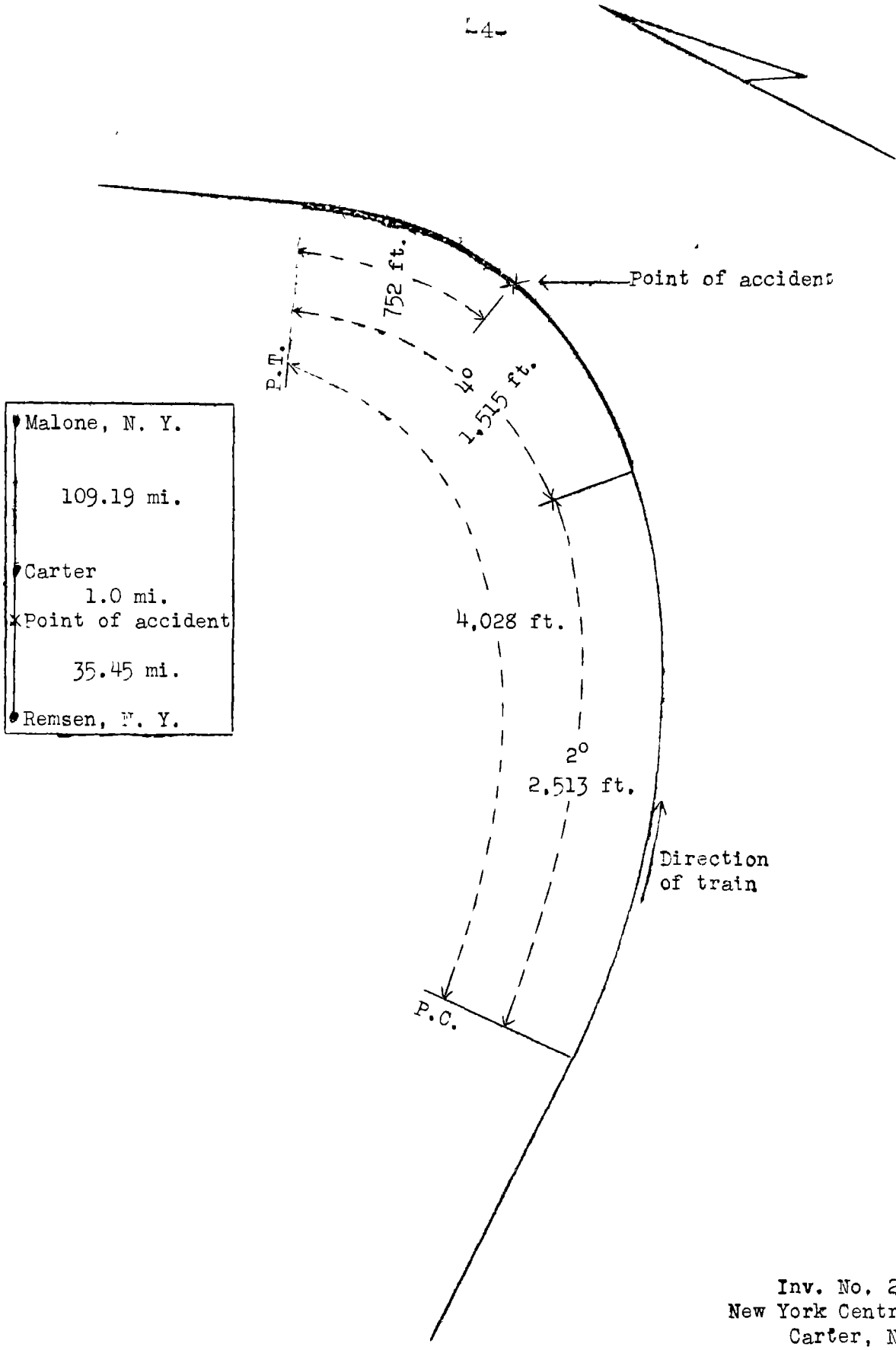
The track is laid with 105-pound rails, 33 feet in length, with 20 treated ties to the rail length, single-spiked, fully tieplated and ballasted with limestone to a depth of 6 inches under the ties, on a subgrade of yellow clay and sand. The track is well maintained.

It was dark and a light snow was falling at the time of the accident, which occurred about 8:15 p.m.

Description

Extra 2149, a north-bound freight train, consisted of 5 cars, engine 5181, 21 cars and a caboose, in the order named, hauled by engine 2149, and was in charge of Conductor Reynolds and Enginemen Armstrong and Kelly. This train departed from Remsen, 36.45 miles south of Carter, at 7:05 p.m., according to the train sheet, and on approaching Carter was derailed while traveling at a speed estimated to have been 30 miles per hour.

Engine 2149 and the first 4 cars were not derailed or damaged. The fifth car stopped partially on its side, to the right of the track, approximately 455 feet beyond the point of derailment, with its rear truck and both pair of wheels of the front truck about 264 feet beyond the point of derailment, and the truck side frames and other parts scattered through



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the wreckage. Engine 5181 stopped on its right side, in reverse position, on the left side of the track just beyond the fifth car, while the tender and following 7 cars were derailed and stopped in various positions within a distance of 220 feet. The eighth, ninth and tenth cars behind engine 5181 remained upright with all wheels derailed with the exception of the front truck of the tenth car. The employee killed was the engineman of engine 5181 and the employee injured was the fireman of that engine.

Summary of evidence

Engineman Armstrong, of the lead engine, stated there was nothing unusual in the movement of the train from Utica, his initial terminal, to the point of accident. The air brakes had been tested, worked properly en route, and he looked back over the train on curves but at no time did he see anything wrong. The train was traveling at a speed of about 30 miles per hour when the air brakes were applied, and the front portion of the train stopped about 4 car lengths beyond the wreckage.

Fireman Gries, of the lead engine, and Head Brakeman Chase also stated they saw nothing wrong when they looked back over the train. While snow was being blown around, Fireman Gries thought that had fire been flying from the running gear of the cars between the two engines he could have seen it. When the stop was made at Remsen, Head Brakeman Chase inspected the cars in the head portion of the train and did not see anything wrong.

Fireman Montana, of engine 5181, was sitting on his seat box when the engine became derailed prior to that time and he had not seen any indication of the car ahead being derailed.

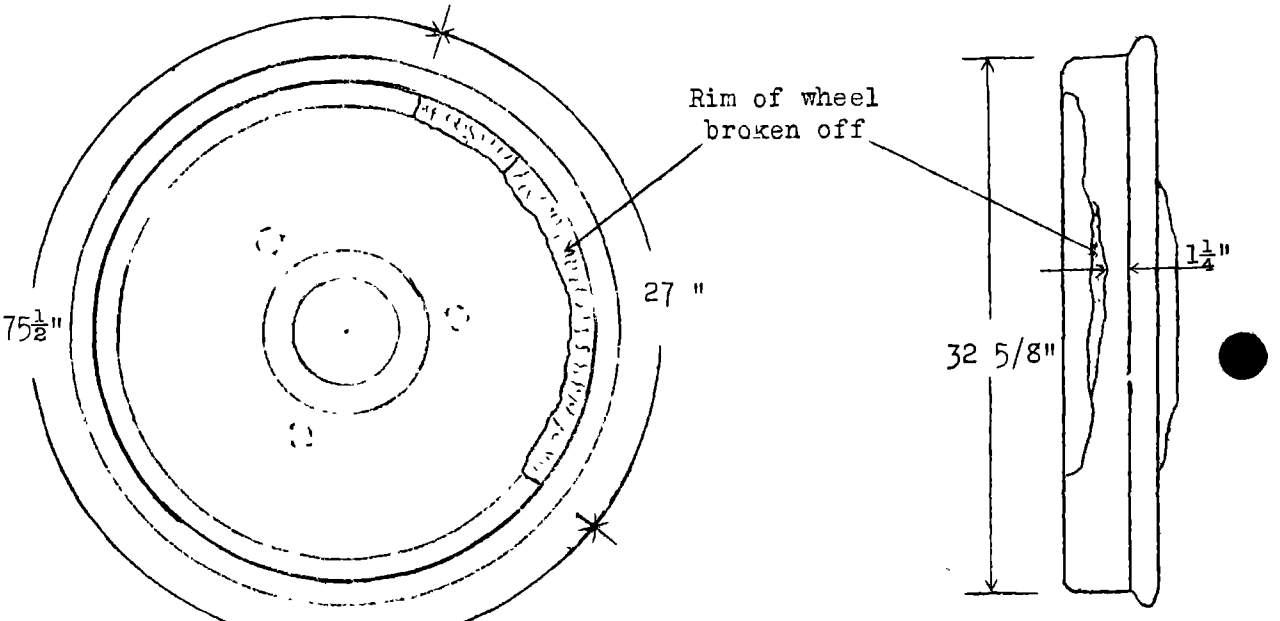
Conductor Reynolds stated that the entire train was inspected at Remsen; he walked up with the middle brakeman, inspecting the cars, until they met the head brakeman. Middle Brakeman Wight also looked the train over as it pulled by him.

Flagman Peach stated that he was on the left side of the cupola with his head out of the window when the air brakes were applied in emergency, but up to that time he had not seen anything wrong with the train. As soon as the train stopped he went back to flag and he did not see any indication of dragging equipment on the track.

Car Inspector Byrnes stated that he inspected the equipment in Extra 2149 before its departure from Utica, thoroughly inspected the brakes and wheels; he found several defects which he repaired and which he thought included placing a brake shoe on one of the wheels on the fifth car in the train. He also

gauged a wheel on this car, but the flange would not take the 1 inch gauge. He made the air brake test, found the brakes worked properly and considered the train in good condition on leaving that point.

General Car Foreman Ruxton stated that the accident was caused by a broken wheel tread on the fifth car in the train, B&O 124105. This wheel was the L-4, lead wheel of the lead truck, A end; the circumferential length of this broken rim fracture was 27 inches and the fracture extended to within $1\frac{1}{4}$ inches of the throat of the flange. Detailed inspection revealed some interwoven circumferential cracks in the remaining portion of the tread, indicating a defective wheel which could not be discovered in ordinary inspection. It was a 33-inch cast iron wheel, #5 tape, mounted on a steel axle, $5\frac{1}{2}$ by 10 inch journals; double plate wheel #9960, cast 2-23-28, manufactured by the Maryland Car Wheel Company, Baltimore, Md., under ARA 1920 specifications; weight, 750 pounds. The right No. 4 wheel, the mate to the defective wheel was of the same manufacture, kind and weight, being cast on 2-24-28, and bearing number 10247. A portion of flange $21\frac{1}{2}$ inches in circumferential length was broken from this wheel, the fracture being 100 percent new, and it is evident that when the left wheel dropped inside the left rail, a severe thrust was placed between the flange of the right wheel and the gauge side of the right rail, causing a portion of the flange to break off. The flange of this wheel was noticeably worn, the wear being quite uniform throughout the circumference, but careful measurements and check with an A.A.R. standard wheel gauge indicated



the wear was insufficient to condemn and remove the wheel. None of the broken portions of either wheel were found, due to the heavy fall of snow at the time of the accident, and to the fact that the track was badly torn up.

This car was an all-steel HM hopper car, having a capacity of 100,000 pounds, load limit 126,000 pounds, light weight 42,900 pounds and was loaded with coal weighing 92,300 pounds at the time of the accident. It originated on the Baltimore & Ohio R.R. December 31, 1935, and was received on the New York Central Railroad at Maplewood, N. Y., January 2, 1936. On its arrival at DeWitt, N.Y., a hump pit inspection was made and no exceptions to the car were taken at that time. The car was again inspected after being assembled in a train and no defects were found. The next inspection was made after it was assembled in Extra 2149 at Utica, and a defect was reported and repaired on the leading truck, A end, at the R-3 location, this defect consisting of a brake shoe with the top broken and a portion of it missing. The records of the Baltimore & Ohio Railroad show that the R-4 and L-4 wheels on this car were shipped by the manufacturers to the B&O shops at Cumberland, Md., on April 10, 1928, and while the records of the B&O prior to January 1, 1929, have been destroyed, it is assumed that the application of these wheels was made sometime between April 10 and December 31, 1928. The journal boxes under this car were last jacked and repacked by the Baltimore & Ohio Railroad on November 22, 1935, and the air brakes were last cleaned on the same date; the wheels bore no evidence of brakes sticking.

Faint marks were found on top of the left rail at intervals of 8½ feet beginning at a point 3,045 feet south of the point of derailment; these marks were crescent shaped, 15/16 inch in length with one end terminating 5/8 inch from the inner edge of the ball of the rail, and corresponded to one revolution of the broken wheel. For a distance of 380 feet just south of the point of accident the marks were more pronounced and there were slight cuts in gauge side of rail.

Examination by the Commission's inspectors of the wheel involved showed the part of the broken tread remaining in the wheel to be cut and ground to a marked degree along its outer edge, in a manner which showed conclusively that this remaining narrow section of tread, adjacent to the flange, had wedged or slipped down on the inside of the rail. The metal in the tread of the wheel at the ends of the fracture showed evidence of violent blows and an additional irregular piece of the tread at the end of the fracture, weighing about 4 pounds, was found to be cracked and almost broken off and was readily knocked off by a hammer blow. Neither the wheel tread nor the flange were found to have excessive wear, and both were well within the limits of the standard A.A.R. wheel gauge. Careful examination

of the tread, when well cleaned, showed several longitudinal and intervoven lines.

Examination of the mate wheel disclosed both the flange and tread to be noticeably worn, the wear being quite uniform, but a careful test with an A.A.R. standard gauge indicated the wear insufficient to condemn the wheel.

The axle was A.A.R. standard, class "D", for nominal 100,000 pound capacity car and in good condition other than some small cuts on the collar which resulted from the accident. Both wheels were found to be tight on the axle and concentric with the journals; the gauge, alignment and rotundity conformed with the requirements of the A.A.R. specifications, with no evidence of brake burns, slid flat or shelled-out spots or indications of having been overheated. No flaws or defects were visible in the broken wheel which could be specifically designated as the cause for its failure. It was apparent, however, that there was a deficiency of chill at the tread as indentations were readily made in the running surface of the tread by sledge blows. Pieces were cut from the cross section of the tread and also through the inside plate and sent to the test department of the New York Central Railroad for tests and analysis and the report of the engineer of tests shows the following chemical analysis:

		Back plate		Mottle grain 1½" from throat of flange 3/16" below tread surface
Total carbon (average 4 tests)		3.46%		3.59%
Graphitic carbon (average 4 tests)		3.21		1.88
Combined carbon		.25		1.71
Manganese		.68		.67
Phosphorous		.33		.29
Sulphur (oxidation solution)	(a)	.142	(a)	.144
	(b)	.148	(b)	.145
Silicon		.59		.50

From the chemical analysis and examination of the wheel, the conclusion of the engineer of tests was that the wheel failed because of insufficient chill in the tread; that in lieu of ½ inch minimum depth chill at tread required by A.A.R. specifications, the broken wheel was found to have no chill; that all the evidence indicated the breaking down of the tread which led to the actual fracture occurred very rapidly after it originated and there was probably no indication of the condition detectable by inspection when the car was last inspected; that the low combined carbon disclosed by the analysis indicates a lack of chill in the wheel when manufactured; that in a properly chilled wheel the combined carbon would be between .50 and .70 percent in the back plate and approximately 3.00 percent at a point 3/16 inch below the tread surface, whereas the broken wheel contained but .25 percent combined carbon in the back plate and 1.71 percent at a point 3/16 inch below the surface of the tread, with correspondingly increased amounts of graphite carbon.

A treatise on car wheels by the Association of Manufacturers of Chilled Car Wheels states:

> "When wheels are low in combined carbon and high in graphite there is a double element of weakness. The matrix itself is weakened by excess ferrite and is further weakened by an addition of graphite. This is an exceedingly important item in preventing the shipment of wheels of this character for heavy service."
>
> "In the attempt to avoid coarse crystalline structure in the throat of wheels, containing 3.40 percent combined carbon, an equally serious error is often made by foundrymen in producing wheels below the AAA minimum in chill with low combined carbon in the plate of the wheel. Iron low in combined carbon is weak from two standpoints: (1) the matrix is weakened because the combined carbon is low and (2) the mass is weakened on account of the excess amount of graphite. From every standpoint this represents weakness in structure."

Track and bridge restrictions prohibit double heading over this territory when a class H-6 engine is involved; engine 5181 was of this class, and therefore 5 cars were placed between the two engines in accordance with these restrictions.

A field check of track conditions disclosed the compound curve to be regular, with practically no variation from true alignment, and there was no indication of spread track or wide gauge.

Discussion

The evidence indicates that a piece broke from the tread of the left front wheel, lead truck of B&O car 124105, the fifth car in the train. From the marks on the left rail it is evident that after the fracture occurred other pieces were chipped or broken off by the violent pounding effect as the wheel continued to revolve and the tread was soon destroyed or reduced to such an extent that sufficient bearing surface was no longer left to support the load; it then dropped inside of the rail, causing a side thrust which broke the flange of the opposite wheel and allowed it to drop off on the right side of the right rail. A heavy snow covered the ground at the time of the accident and continued to fall after the accident occurred; no pieces of the broken tread or flange could be found. The crew at no time noticed anything wrong prior to the derailment, and the heavy snow no doubt extinguished any sparks or flying fire which may have been caused by the broken wheel coming in contact with the rail.

It is evident from the laboratory analysis of the wheel that the conditions or weaknesses which led to its failure were inherent within the wheel from the time of its manufacture because of a deficiency of combined carbon and an excess of graphite in the tread, and a lack of sufficient chill to meet the A.A.R. specifications; this condition is specifically referred to in a treatise by the Association of Manufacturers of chilled car wheels as a weakness of vital importance against which caution must be taken. Although the wheel rendered considerable service, it was far from the condemning limits of wear for such wheels, which fact makes wheels of this character an extraordinary element of hazard, because when once accepted from the manufacturer and placed in service, there is little if any possibility of detecting such inherent weakness and, as in this case, the wheel may suddenly collapse in fair usage long before it becomes worn to an extent justifying removal. The remedy for prevention of such hazards must, therefore, necessarily lie at the source, that is in the manufacturing processes and in the inspection and tests made by the purchaser before accepting and putting wheels in service.

Conclusion

This accident was caused by a broken wheel.

Respectfully submitted,
W. J. PATTERSON,
Director.