Inv-2048

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT OF THE DIRECTOR

BUREAU OF SAFETY

ACCIDENT ON THE

BALTIMORE AND OHIO RAILROAD

WHEATLAND, IND.

FEBRUARY 26, 1936

INVESTIGATION NO. 2048

SUMMARY

Railroad:	Baltimore and Ohio
Date:	February 26, 1936
Location:	Wheatland, Ind.
Kind of accident:	Derailment
Train involved:	Freight
Train number:	No. 88
Engine number:	4565
Consist:	36 cars and caboose
Speed:	40-45 m.p.h.
Track:	Tangent; slightly descending grade
Weather:	Rain
Time:	9:58 a.m.
Casualties:	4 killed and 3 injured
Cause:	Broken wheel

To the Commission:

On February 26, 1936, there was a derailment of a freight train on the Baltimore and Ohio Railroad near Wheatland, Ind., which resulted in the death of 4 trespassers and the injury of 3 trespassers.

Location and method of operation

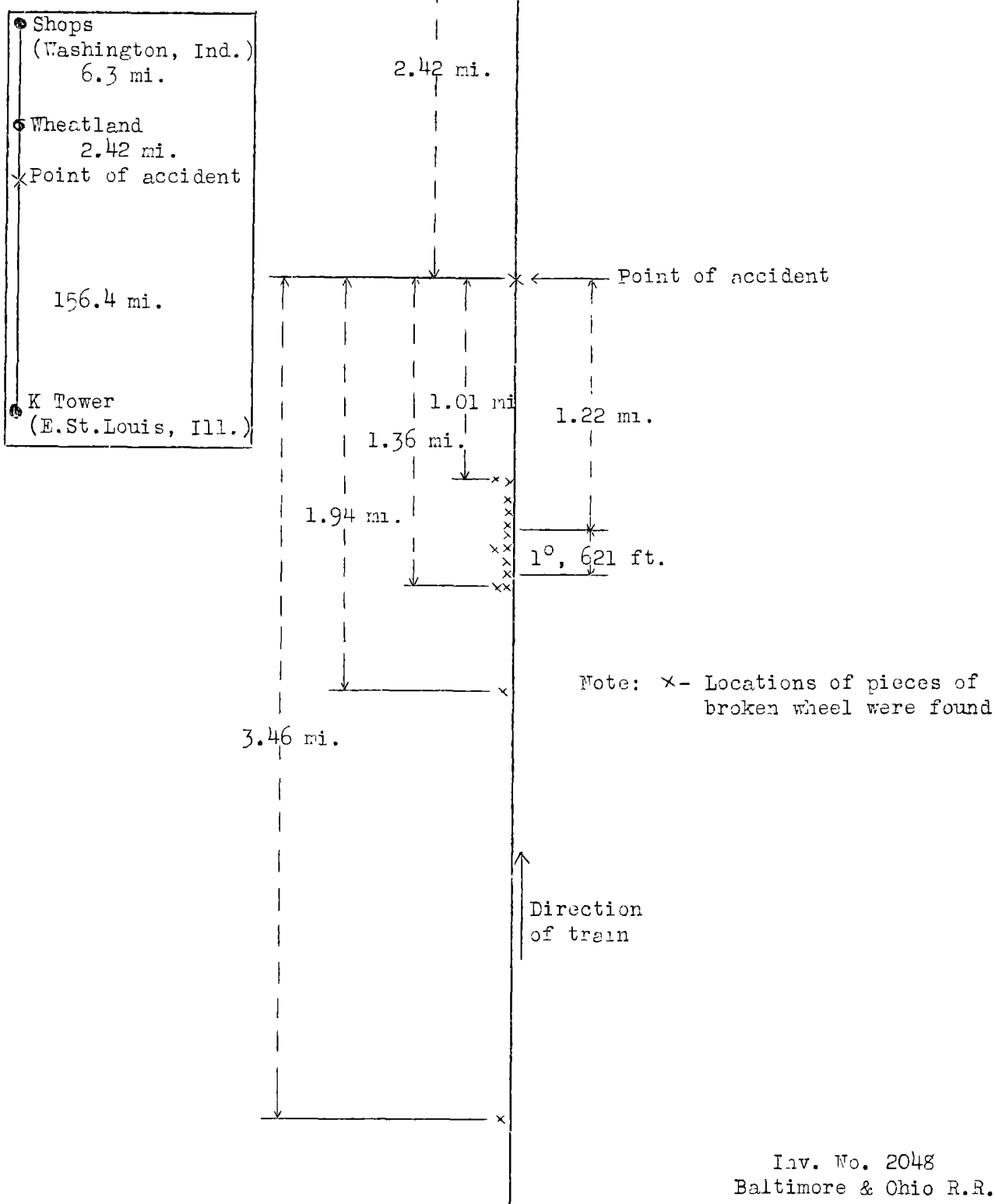
This accident occurred on the Illinois Sub-division of the St. Louis Division, which extends between Shoals, near Washington, Ind., and K Tower, near East St. Louis, Ill., a distance of 165.1 miles, and in the vicinity of the point of accident is a single-track line over which trains are operated by time table, train orders, and a manual block-signal system. The accident occurred at a point 2.42 miles west of the station at Wheatland; approaching this point from the west, the track is tangent for more than 1 mile, while the grade is 0.02 percent descending at the point of accident.

It was raining at the time of the accident, which occurred about 9:58 a.m.

Description

Train No. 88, a second-class east-bound freight train, consisted of 36 cars and a caboose, hauled by engine 4565, and was in charge of Conductor Platz and Engineman Denham. This train, which started from Venice, Ill., departed from Vincennes, Ind., 11.8 miles from Wheatland, at 9:35 a.m., according to the train sheet, 4 hours 25 minutes late, and was derailed on approaching Wheatland while traveling at a speed estimated to have been between 40 and 45 miles per hour.

The engine, tender and first car were not derailed. The second to the twenty-first cars, inclusive, and the front truck of the twenty-second car, were derailed. The second car stopped on the right or south side of the track, about 13 feet from the south rail and 327 feet beyond the point of derailment, the entire superstructure being demolished and the underframe in reverse position, bottom up. The trucks were on the left side of the track, the lead truck almost completely buried in the ground under the other cars, about 173 feet beyond the body of the car, and the rear truck about 48 feet beyond the body of the car. The other derailed cars were piled up within a distance of 250 feet, the majority of them stopping beyond the second car; 10 cars were destroyed and the others badly damaged.



Note: × - Locations of pieces of broken wheel were found

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Summary of evidence

Engineman Denham stated that he was operating his train at normal speed, between 40 and 45 miles per hour, when the air brakes were applied in emergency and he looked back and saw the cars being derailed. Engineman Denham, and also Fireman Arford and Head Brakeman Graham, had looked back over the train on rounding various curves, including the curve west of the tangent on which the accident occurred, but none of them had seen anything wrong, nor had the fireman noticed any unusual riding of the engine prior to the derailment. The head brakeman, and also the conductor, had inspected various portions of the train at HN Cabin, Breese and Carlyle, all of these stations being more than 100 miles from the point of accident, while cars had been set out and picked up at Flora and Vincennes, the last-named station being 11.8 miles from Wheatland, but at no time did they notice anything wrong, and the conductor also said that after leaving Vincennes he received a proceed signal from section men working along the track.

Track Supervisor Thome found from the first marks of derailment that wheels had been derailed to the right or south side of the track. A flange mark extended on top of the south rail for a distance of 12 feet, followed by marks on the ties for a distance of 80 feet. He gauged the track and took cross levels, both under load and without load, and found that the level checked the same under both conditions. There was some evidence of churning or pumping of ties due to recent rains and thaws, but it was not sufficient to result in any unsafe condition that would cause or contribute to the derailment. Supervisor Thome also said that pieces of broken wheel were found scattered along the track within a distance of 3.46 miles west of the point of accident, and beginning at a point 1½ miles from the point of accident there were marks on the top and gauge side of the north rail, these marks being spaced 103 or 104 inches apart, and when making a regular inspection on a motor car on February 29, near a railroad crossing at Vincennes, he found a piece of wheel rim on the north side of the track which measured 5/8 inch thick and 7 inches in length.

Car Foreman Chew stated that from his inspection of the derailed equipment it was his opinion that this accident was caused by a broken wheel, this being the R-1 or lead wheel on the left or north side of the front truck of the second car in the train, which was M. & O. box 23252. This opinion was supported by Master Mechanic Burkley, Division Engineer Gabriel, Road Foreman of Engines Stambaugh, Train Master Cavey and Track Supervisor Thome.

Car Inspector Myler, of the Alton Railroad, located at Venice, from which point Baltimore & Ohio trains are dispatched, stated that he inspected M.& O. box 23252 on its arrival on the evening of February 25, making a class "A" inspection, which includes an inspection of each wheel. He found several minor defects, such as worn-out cotter keys and brake shoe keys, and also detected a chill-

worn condition on the R-1 wheel, on which the tread appeared to be widening slightly and was worn; he then used the gauge for the purpose of measuring this condition but said he could not properly condemn the wheel and in making his report he showed the wheel as being chill-worn but not out of gauge; he also examined the tread for cracks or any indication of a breaking down of the tread section, but found nothing more than the worn chill spots and considered the wheel safe to proceed to its destination. Car Inspector Myler further stated that during the last 2 or 3 months he had found an average of 6 or 8 wheels a week which had to be removed on account of chill-worn conditions, and he did not know of any case in which he had been overruled or his judgment questioned by the shop foreman. General Car Foreman Wood, also of the Alton Railroad at Venice, stated that he had known Car Inspector Myler since May 1, 1932, and had found him to be a man of good judgment and thoroughly qualified for the duties of car inspector, and never had found any reason to take exception to his work.

Car Inspector McCarrell, at Flora, Ill., 65.8 miles from Wheatland, stated that he made a class "C" inspection of the cars in Train No. 88 on its arrival at 7:50 a.m. Five cars were picked up at this point and after they had been coupled in the train he made an air-brake test of these cars. He took about 18 minutes in making the inspection of the train, looking at each wheel, and as the entire train pulled by him he did not hear any pounding wheels or other unusual noises.

Inspection of the track by the Commission's inspectors disclosed the marks of derailment as previously described, as well as the marks on the north rail at regular intervals, which extended westward about 2 miles; these latter marks consisted of indentations or abrasions on the ball of the rail, varying in size and intensity, and at some points cutting the gauge edge of the rail, and they varied from merely a noticeable point of contact to as much as 12 inches in length.

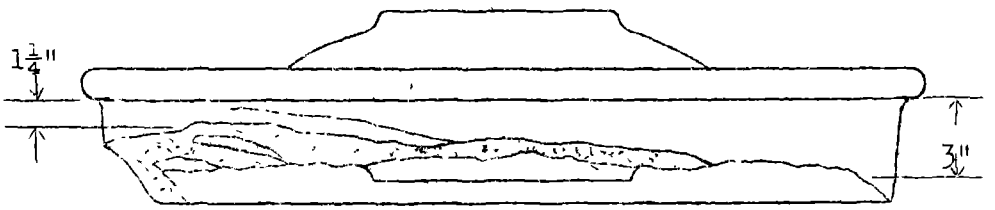
The car involved was a box car equipped with trucks of the arch-bar type, with 5 by 9-inch journals and cast-iron wheels. It had a capacity of 80,000 pounds and a light weight of 43,100 pounds, and was built in February, 1924, by the American Car and Foundry Company; the last cleaning date was September 13, 1935. This car originated at Billingsley, Ala., on February 24, and was loaded with lumber having a net weight of 68,700 pounds. Examination of the R-1 wheel showed the tread to be broken for a circumferential distance of 57 inches, the fracture extending to within $1\frac{1}{4}$ inches of the gauge point of the flange and tapering off diagonally from that point, in both directions around the circumference, toward the outer edge or rim of the wheel. At the point of maximum fracture it extended into and included a small section of the plate of the wheel, leaving an irregular hole through the

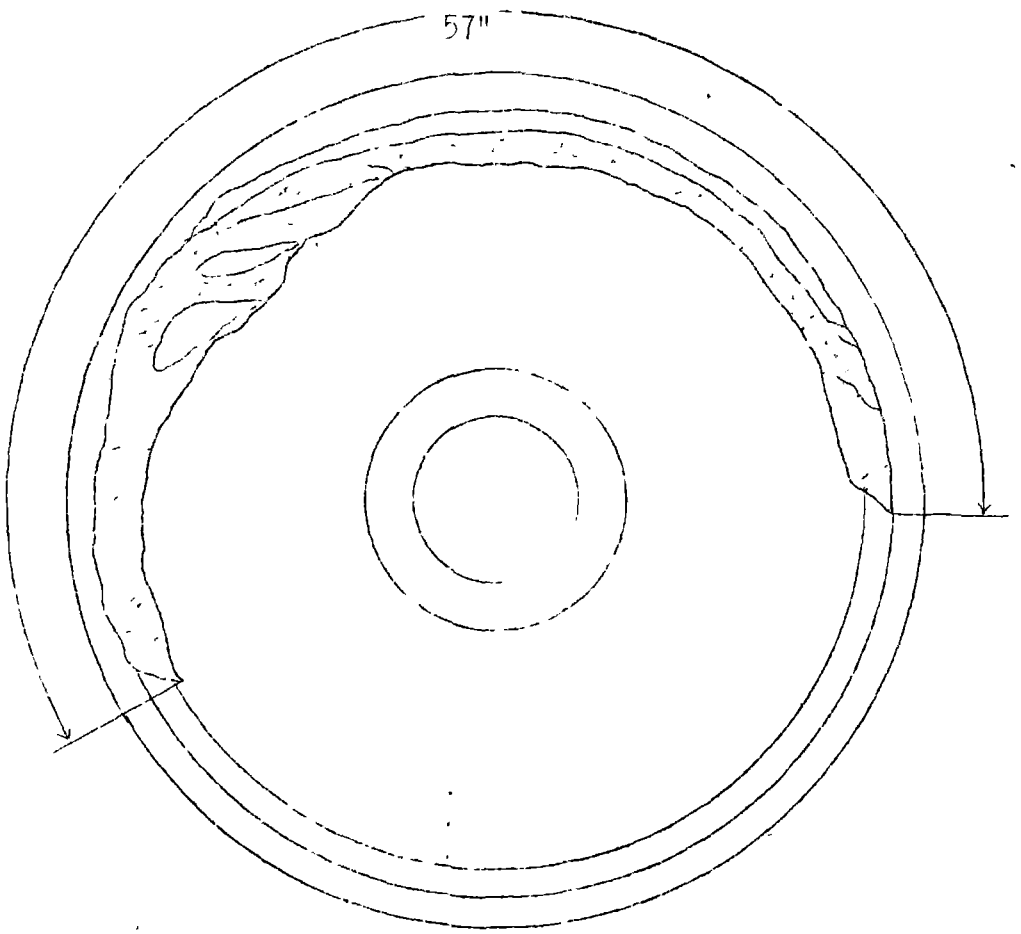
plate immediately under the tread section which measured about 2 by 5 inches. Inspection did not reveal any old flaws or any evidence that the wheel had been heated; the outer edge of the broken tread, however, was badly cut and ground off for about three-fourths of its circumferential length, and a large groove had been worn in it. That portion of the total tread which was left on the wheel showed no defects and the flange was not worn thin or vertical at any point, while the wheel was concentric with the journal and mounted to proper gauge on the axle. The flange of the mate wheel was broken for a distance of about 12 inches; this was a new, clean break, and evidently was the result rather than the cause of the derailment. The wheel involved was a double-plate, cast-iron wheel and was marked "Altoona- P.R.R. - ARA 1917" on the outside face and "78403-3-20-28-700" on the inside face, with an indicated 5 tape size. The mate to this wheel bore the same markings, except that the number was 78812 and the date cast was 3-25-28.

Examination of the broken wheel by Engineer of Tests Van Gundy, of the Baltimore and Ohio Railroad, disclosed that its failure was due to the absence of chill in the tread; a number of circumferential interwoven cracks also were found in the rim and tread, but there were no indications of overheating at any place. Chemical analysis was made of metal taken from a point at the junction of the front and back plates and also from a point one-fourth inch below the tread surface and 1½ inches from the throat of the flange, with the following results:

	Junction of Plates	Mottle grain 1/4 inch below tread surface
	Percent	Percent
Total carbon----------	3.32	3.34
Graphitic carbon--------	3.03	3.12
Combined carbon---------	0.29	0.22
Manganese---------------	0.85	0.82
Phosphorus--------------	0.200	0.200
Sulphur-----------------	0.131	0.135
Silicon-----------------	0.66	0.66

Engineer Van Gundy said this analysis indicated a very unusual condition, the combined carbon being very low, and it was lower in the tread section than in the plate. The total carbon and other constituents were approximately normal, but there was not a good balance between the manganese and silicon. The main weakness in the wheel was stated to have been due to faulty foundry practice which failed to develop chill and mottled iron; the low combined carbon content confirmed the low chill on the wheel at the time of manufacture.





Sketch showing extent of broken rim on chilled tread wheel.

Discussion

The investigation developed that a portion of the tread broke off from the left front wheel of the lead truck of the second car in the train, the first piece that was found having been located at a point about 10 miles west of the point of accident, and the breaking down of the tread developing quite rapidly after it started, becoming serious within a distance of a few miles. The abrasions on the rail and the condition of the edge of the broken tread showed that there was intense friction as the broken wheel tended to slip off and wedge down inside of the rail for a distance of about 2½ miles before it finally forced the opposite wheel flange to climb the rail. The wheel that failed was examined by a car inspector on the day prior to the accident and was found to be chill worn, but measurement with the gauge failed to condemn the wheel, while subsequent inspections en route failed to disclose anything wrong. The portion of the tread of the wheel which remained in place after the accident showed no defects, making it evident that the failed section included the chill-worn portion noted by the inspector. The metallurgical examination developed that there was a deficiency in the chill of the tread and that the tread crushed and broke down as a result of this condition. The conditions which led to the failure were inherent within the wheel from the time of its manufacture and the visual indications of a chill-worn condition which were noted by the car inspector were a timely indication of approaching failure which, if they had been heeded, would have averted the accident, but the indications were not of such an extent as to permit condemning the wheel by the use of the prescribed gauge, this being in line with an interpretation under A.A.R. Interchange rule 71 wherein it is stated that regardless of how close they may be to the limit, "Wheels must not be removed at car owner's expense until they have reached the prescribed condemning limits".

Under A.A.R. rule 73, a gauge has been specified for use on chill-worn wheels and it is provided that "Wheel shall not be removed from service if tread is not out of round in excess of 1/16 inch within an arc of 12 inches or less and then only if worn through chill". Careful use of this prescribed gauge by a car inspector with extensive experience failed to condemn the wheel in question, although it was visibly chill-worn, and the tread actually collapsed with disastrous results during the first train movement immediately thereafter. Increased train speeds, with corresponding increase in the demands placed on the wheels which carry them, together with growing competition by other types of wheels against the chilled iron wheel, undoubtedly have brought about improvements both in design and in manufacturing precision, and it is reasonable to expect that the hazards of inherent weaknesses due to low chill and other causes have been greatly reduced in the more recent designs and manufacturing processes. That

happened in this instance, however, directs attention to the need for some flexibility in the rules governing the condemnation of wheels of old dates which show indications toward failure.

Conclusion

This accident was caused by a broken wheel.

Recommendation

It is recommended that careful consideration be given to the question of whether some degree of variation, and some consideration for the date of manufacture, is justified in the condemning rules governing wheels manufactured many years ago as compared with wheels of more recent design and manufacture.

Respectfully submitted,

W. J. PATTERSON,

Director.