

Inv-2430

INTERSTATE COMMERCE COMMISSION

WASHINGTON

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REPORT OF THE DIRECTOR

BUREAU OF SAFETY

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ACCIDENT ON THE  
BALTIMORE & OHIO RAILROAD

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CLARION JUNCTION, PA.

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JUNE 5, 1940

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INVESTIGATION NO. 2430

SUMMARY

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Inv-2430

Railroad: Baltimore & Ohio  
Date: June 5, 1940  
Location: Clarion Junction, Pa.  
Kind of accident: Derailment, followed by side collision  
with freight train on adjacent track.  
Trains involved: Passenger :Freight  
Train numbers: 53 :Extra 7526  
Engine numbers: 5055 :7526, helper 7324  
Consist: 8 cars :59 cars and caboose  
Speed: 45-55 m.p.h. :12-15 m.p.h.  
Operation: Timetable, train orders, and automatic  
block system.  
Track: Double; 8°41' curve; 0.60 percent  
descending grade westward.  
Time: 1:57 a.m.  
Weather: Clear  
Casualties: 1 killed; 2 injured.  
Cause: Excessive speed on sharp curve.

Inv-2430

July 8, 1940.

To the Commission:

On June 5, 1940, there was a derailment of a passenger train on the Baltimore & Ohio Railroad near Clarion Junction, Pa., followed by a side collision with a freight train moving in the opposite direction on an adjacent track, which resulted in the death of one employee and the injury of two express messengers.

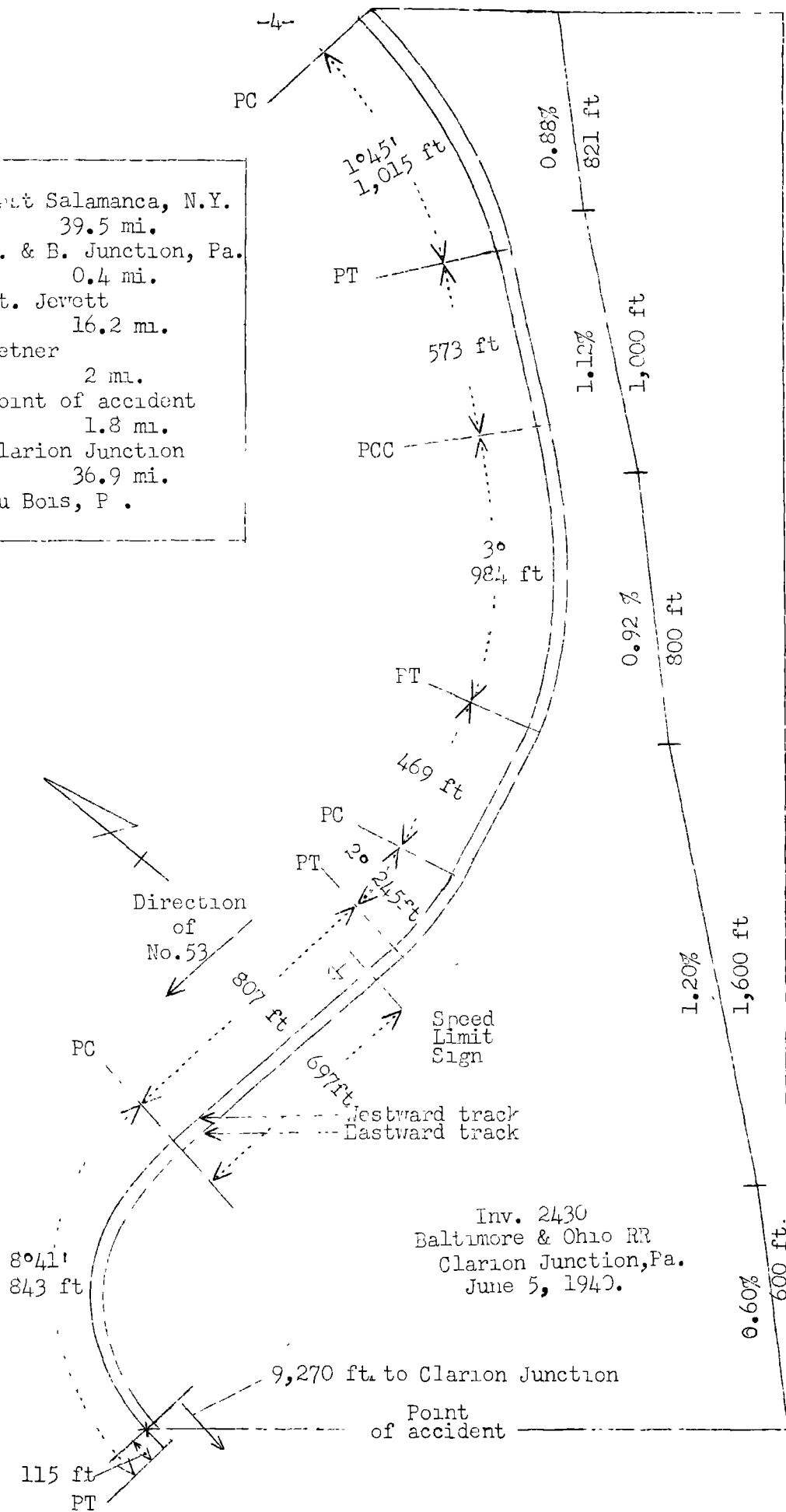
#### Location and Method of Operation

This accident occurred on that part of the Buffalo Division designated as the Second Sub-Division which extends between East Salamanca, N.Y., and Du Bois, Pa., a distance of 96.8 miles. In the vicinity of the point of accident this is a double-track line over which trains are operated by time-table, train orders and an automatic block system. The derailment occurred on the westward track at a point 9,270 feet east of Clarion Junction. Approaching this point from the east there are, in succession, a 1°45' curve to the right a distance of 1,015 feet; a tangent, 573 feet; a compound curve to the right, 984 feet, the maximum curvature of which is 3°; a tangent, 469 feet; a 2° curve to the right, 245 feet; a tangent, 807 feet; and an 8°41' curve to the left, 843 feet; the accident occurred on the last-mentioned curve, known as Laurel Run Curve, at a point 115 feet east of its western end. The grade for west-bound trains approaching the point of accident is, successively, descending 0.88 percent a distance of 1,500 feet, 1.12 percent a distance of 1,000 feet, 0.92 percent a distance of 800 feet, 1.20 percent a distance of 1,600 feet, and 0.60 percent a distance of approximately 600 feet to the point of accident and 100 feet beyond.

The track structure consists of 100-pound rail, 39 feet in length, laid new in 1927 on an average of 22 treated hardwood ties to the rail length; it is fully tieplated and double spiked on the curve involved. In 1939 the track was raised 6 to 8 inches on cinder ballast, surfaced and lined, and many of the ties were renewed. At the time of the accident the maximum superelevation of the westward track on Laurel Run Curve was 6 inches; the gage varied between 4 feet 8-1/2 inches and 4 feet 9-1/4 inches.

Time-table special instruction 5 reads in part as follows:

- Mt. Salamanca, N.Y. 39.5 mi.
- J. & B. Junction, Pa. 0.4 mi.
- Mt. Jewett 16.2 mi.
- Ketner 2 mi.
- Point of accident 1.8 mi.
- Clarion Junction 36.9 mi.
- Du Bois, P. .



-5-

## 5. SPEED RESTRICTIONS

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Permanent speed restrictions are placed on certain curves --- restrictions indicated by speed limit signs, triangular metal target. Figures indicate maximum allowable speed. Sign will refer to next curve beyond sign.

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The maximum authorized speed on the westward track in the vicinity of the point of accident is 40 miles per hour. A triangular speed-limit sign bearing the numerals "35", in black on a yellow background, is located at a point 697 feet east of the eastern end of Laurel Run Curve and is approximately 7 feet north of the center of the westward track and about 4 feet higher than the top of the rails.

The weather was clear at the time of the accident, which occurred at 1:57 a.m.

## Description

No. 53, a first-class west-bound passenger train, with Conductor Hayes and Engineman McFarland in charge, consisted of engine 5055, of the 4-6-2 type, one express car, one box car, one baggage car, one baggage-mail car, one baggage car, one coach, and two Pullman sleeping cars, in the order named; all cars were of steel construction except the first car, which was of steel underframe and wooden superstructure construction. This train departed from East Salamanca, 59.9 miles east of Clarion Junction, at 12:15 a.m., according to the train sheet, on time, passed J. & B. Junction, the last open office, 20.4 miles east of Clarion Junction, at 1:27 a.m., 4 minutes late, and, while moving at a speed estimated to have been from 45 to 55 miles per hour, became derailed on Laurel Run Curve. The derailed equipment struck the side of a freight train moving in the opposite direction on the eastward track.

Extra 7526, an east-bound freight train, with Conductor Lobough and Enginemen Jones and Wheeler in charge, consisted of engine 7526, 59 loaded cars, a caboose, and helper engine 7324, in the order named. This train departed from Clarion Junction at 1:52 a.m., according to the train sheet, and, while moving around Laurel Run Curve at a speed of 12 to 15 miles per hour, was sideswiped and derailed by the derailed equipment of No. 53.

Engine 5055, of No. 53, and its tender remained coupled and stopped on their right sides, partly buried in the ground, at a point 223 feet west of the point of derailment, north of the westward track and parallel to it. The engine truck was torn loose from the engine and stopped about 256 feet west of the engine, practically demolished; the engine frame was broken at the left front pedestal; the trailer frame and wheels were badly damaged; the left-eccentric crank-arm was broken; the cab was torn off, and the right sides of the engine and the tender were badly scraped and damaged. The first six cars ran by the engine and the trucks of these cars were badly damaged as a result of striking the engine trailer and the tender trucks. The trucks of the first car, B. & O. express car 1761, were torn loose and stopped at a point about 233 feet west of the engine; the body of this car skidded along the track on its underframe and stopped practically demolished on its left side at a point 714 feet west of the engine. The second car, B. & O. box car 361898, was derailed and stopped in an upright position, badly damaged, with the west end against the side of the helper engine of the freight train and the east end on the westward track at a point 298 feet west of engine 5055. The third car, B. & O. baggage car 450, was derailed and stopped immediately to the rear of the second car and practically in line with the track; both ends were damaged, and the roof and both sides were scraped and torn. The fourth car, B. & O. baggage-mail car 207, was derailed and stopped, practically upright, diagonally across the westward track immediately to the rear of the third car; the left side-sheets were bent and torn. The fifth car, B. & O. baggage car 490, was derailed and stopped, practically upright, diagonally across the westward track and immediately to the rear of the fourth car; the entire right side was torn out, and the roof was bent and torn. The sixth car, B. & O. coach 5307, was derailed and stopped upright, parallel to the track, immediately to the rear of the fifth car and opposite engine 5055; the left front corner was crushed and the air-conditioning unit was damaged. The west truck of the seventh car, Pullman Dalegrove, was derailed and its left side was slightly raked. The eighth car, Pullman Marlin, was neither derailed nor damaged.

The cars of Extra 7526 were slightly damaged from the forty-ninth car to the helper engine as a result of being scraped on the north side; the forty-ninth to the fifty-fifth cars, inclusive, were derailed.

The employee killed was the engineman of No. 53.

## Summary of Evidence

Fireman Rice, of No. 53, stated that an air-brake test was made at East Salamanca, and as the train was leaving that point a running test of the brakes was made. His train left Mt. Jewett, 20 miles east of Clarion Junction, 4 minutes late. Between Mt. Jewett and Ketner Cut, the latter located approximately 3 miles east of the point of accident, five brake-pipe reductions were made to comply with speed restrictions. Just east of Ketner Cut a brake-pipe reduction was made and the speed was reduced to 20 or 25 miles per hour through the cut. After the train passed through the cut another brake-pipe reduction was made to comply with a speed restriction and then the brakes were released. The engineman dimmed the headlight for a approaching east-bound freight train and restored it to bright after his engine passed the engine of the freight train. Immediately afterward the fireman saw Laurel Run Curve ahead and was in doubt that his train would safely round the curve; He looked at the engineman who had his hand on the automatic brake-valve handle and was looking out the cab window; this gave the fireman the impression that the engineman intended to apply the air brakes. The engine was rolling laterally somewhat before it entered the curve. The throttle had been closed and the drifting valve had been open for some time. About midway on the curve the engine rolled laterally and lurched against the low rail two or three times and then the front end seemed to leave the track; the fireman jumped to the deck of the engine and called a warning to the engineman; at this time the speed of the train was about 55 miles per hour. The engine then leaped and turned over before the engineman had time to apply the air brakes. He said the engineman was in good health and had complied with all speed restrictions until reaching the point of accident. The fireman said that the east-bound freight train approaching and passing on the adjacent track made it difficult for him to ascertain the location of Laurel Run Curve, and it was his opinion that the engineman failed to reduce speed for the curve for the same reason. The fireman did not know of any defects on the engine and stated that it rode as smoothly as other engines. The weather was clear at the time of the accident.

Conductor Hayes, of No. 53, stated that his train left Mt. Jewett water tank 7 minutes late. The speed of his train was reduced to comply with all speed restrictions until it reached Laurel Run Curve. A brake application was made for Ketner Cut and the speed was reduced to 15 miles per hour at that point. Another application of the brakes was made for the curve east of Laurel Run Curve but the brakes were not applied for Laurel Run Curve; the speed of his train entering the latter curve was about 45 miles per hour. He said that the engine of an east-bound freight train passed his train on the

tangent track east of Laurel Run Curve. The accident occurred before he became alarmed by the excessive speed on the curve. The accident occurred at 1:57 a.m. He said that the speedometer belt of engine 5055 was missing and he had called the engineman's attention to it at Bradford, 43.8 miles east of Clarion Junction.

Flagman Schumaker, of No. 53, who was in the rear car from Mt. Jewett to the point of accident, corroborated the statement of his conductor, and added that he did not take any action to stop his train because an east-bound freight train was passing and he was not certain about the exact location of his train.

Engineman Jones, of Extra 7526, stated that his train was moving at a speed of 12 or 15 miles per hour when his engine passed No. 53 just east of Laurel Run Curve. Both he and the engineman of No. 53 dimmed their headlights and kept them dimmed until their engines had passed each other, and shortly afterward the air brakes on his train became applied in emergency.

The statements of Fireman Thompson and Front Brakeman McHenry, of Extra 7526, corroborated the statement of their engineman.

The statement of Conductor Lobough, of Extra 7526, added nothing of importance.

Flagman Leo, of Extra 7526, stated that he was on the left side of the cupola when his train was approaching Laurel Run Curve at a speed of 12 to 15 miles per hour. He saw No. 53 approaching and while it was passing his train the headlight bobbed up and down several times and then went out of his sight. Soon afterward the first car of No. 53 sideswiped his caboose and stopped west of the helper engine.

Engineman Wheeler, of helper engine 7324, stated that he was working his engine with a full throttle when he observed No. 53 approaching and soon afterward the air brakes on his train became applied in emergency.

Fireman Haley, of helper engine 7324, stated that he observed No. 53 approaching and saw fire flying from that train when it was rounding the curve. He saw something scraping the side of his train, ran to the right side of the engine, and then the air brakes on his train became applied in emergency. He said that after the coal was removed from the cab of engine 5055 he observed that the automatic brake-valve handle was in running position.



Engineman Charnock, in charge of engine 5055 on No. 53 between Buffalo and East Salamanca, stated that there were no defects on engine 5055 except that the speedometer belt was broken when he turned the engine over to Engineman McFarland. He said the engine rode smoothly and was in good condition.

Watchman Carlson, on duty at Ketner Cut, stated that No. 53 was moving at a speed of 20 miles per hour through Ketner Cut. He observed the train from the south side and there was no indication of anything being wrong.

Car Inspector Vesneski stated that he assisted with the air-brake test on No. 53 at East Salamanca and the brakes applied and released properly.

Division Engineer Hammond stated that he arrived at the scene of the accident at 9 a.m. and made a careful examination of the track. From a point 456 feet to a point 223 feet east of the point of derailment he observed newly made flange marks on the gage side of the high rail above the normal position of flange wear; from the latter point to a point 111 feet east of the point of derailment there were wavy tread marks on top of the head of the high rail. At various points these tread marks closely approached the outside edge of the rail. Throughout a distance of 61 feet immediately east of the point of derailment there were rolled flat spots on the horizontal surface and near the outside edge of the head of the high rail. The first mark of derailment, which appeared to be a flange mark, was on a tie 12 inches north of the gage side of the high rail at a point 111 feet west of the tread marks. The next marks were on the outside spikes of the next two ties. The north end of the fourth tie was destroyed. There were three diagonal marks 12, 14, and 19 inches north of the gage side of the high rail on the fifth tie, and beyond this point the track was destroyed a distance of 400 feet. At the point where the first mark of derailment appeared there was a mark on the high rail which extended 3 feet 3 inches diagonally across the ball of the high rail to the point where it ran off the north side and struck the first spike; a similar mark extended 11 inches to the point where the second spike was struck. Supervisor Hoyt gaged the track and computed the cross-level and the middle ordinate at each joint and center throughout a distance of 486 feet immediately east of the point of accident; these were verified by Division Engineer Hammond and are as follows:

Point	Middle ordinate: (62-foot string)	Curvature	Elevation	Gage	Distance east of point of derailment
PD*					
0	-	-	3-1/4"	4' 8-3/4"	18.0'
1	6-7/8"	6°52'30"	4"	4' 8-7/8"	37.5'
2	6-5/4"	6°45'00"	4-5/8"	4' 9"	57.0'
3	7-5/8"	7°37'30"	4-7/8"	4' 9"	76.5'
4	8-1/2"	8°30'00"	5-1/2"	4' 9-1/4"	96.0'
5	8-5/8"	8°57'30"	5-3/4"	4' 9"	115.5'
6 (EE)	8-1/2"	8°30'00"	5-3/4"	4' 9"	135.0'
7	8-1/4"	8°15'00"	5-3/4"	4' 8-1/2"	154.5'
8	8-1/3"	8° 7'30"	5-7/8"	4' 9"	174.0'
9	7-1/2"	7°30'00"	5-7/8"	4' 8-3/4"	193.5'
10	7-3/3"	7°25'30"	5-3/4"	4' 8-3/4"	213.0'
11	9-1/4"	9°15'00"	5-3/4"	4' 9"	232.5'
12	10-7/8"	10°22'30"	5-7/8"	4' 9-1/4"	252.0'
13	9-1/4"	9°15'00"	6"	4' 8-3/4"	271.5'
14	8-1/3"	8° 7'30"	6"	4' 8-3/4"	291.0'
15	7-1/4"	7°15'00"	6-1/8"	4' 8-1/2"	310.5'
16	8-1/4"	8°15'00"	5-3/4"	4' 9"	330.0'
17	9-1/3"	9° 7'30"	5-5/8"	4' 8-3/4"	349.5'
18	8-3/4"	8°41'00"	5-3/4"	4' 8-3/4"	369.0'
19	8"	8°00'00"	5-3/4"	4' 8-5/8"	388.5'
20	8-1/4"	8°15'00"	5-3/4"	4' 8-3/4"	408.0'
21	9-1/3"	9° 7'30"	5-3/4"	4' 8-3/4"	427.5'
22 (EE)	9-7/8"	9°52'30"	5-3/4"	4' 8-7/8"	447.0'
23	9-5/8"	9°22'30"	5-3/4"	4' 8-7/8"	466.5'
24	8-1/2"	8°30'00"	5-1/2"	4' 8-7/8"	486.0'

PD\* - Point of derailment is approximately 13 feet west of station 0.

Road Foreman of Engines Garlitz stated that he examined engine 5055 at the scene of the accident at 7:40 a.m. The automatic brake-valve handle was in running position, the double-leading cock was open, the reverse lever was 70 percent in forward motion, the throttle was closed, and the drifting valve was open. He said that on April 22 he was instructed by the superintendent to impress upon all passenger engineers the importance of complying with speed restrictions on curves. Since that time he had ridden with all passenger engineers in his territory and in doing so had made three trips with Engineer McFarland.

Master Mechanic Mewshaw examined engine 5055 subsequent to the accident and found all wedges free, spring rigging intact and in good condition, and the buffer casting in proper

position and well lubricated. The engine truck was badly damaged but showed no indication of fouling; the connecting castings were in good condition. He furnished the following measurements of the driving and the engine-truck wheels:

<u>Wheel</u>	<u>Lateral</u>	<u>Tire wear</u>	<u>Flange wear</u>	
No. 1 driving wheels	7/13"	1/16"	3/32"	
No. 2 driving wheels	7/16"	1/16"	1/16"	
No. 3 driving wheels	1/2"	1/16"	1/16"	
	<u>Wheel spacing</u>			<u>Outside</u>
	<u>Back to back</u>	<u>Thrust to throat</u>		<u>overall</u>
No. 1 driving wheels	53-1/8"	55-3/8"		64-1/8"
No. 2 driving wheels	53-5/16"	55-3/4"		64-5/16"
No. 3 driving wheels	53-1/8"	55-1/2"		64-1/8"
Engine truck wheels	53-3/16"			

The other pair of engine-truck wheels were damaged and could not be measured.

Thickness of driving wheel tires ..... 3-1/2"  
 Width " " " " ..... 5-1/2"  
 Diameter of driving wheels ..... 73"  
 Width of engine truck wheels ..... 5-1/2"  
 Height of engine truck wheel flange... 1-3/16"  
 Tread wear engine truck wheels ..... 1/16"  
 Diameter of engine truck wheels ..... 31-1/2"

The trailer wheels and frame were badly damaged and information obtainable concerning them was of little value. He stated that no defective condition on the engine which would have in any way contributed to the cause of the derailment was discovered. He said that under prevailing conditions at Laurel Run Curve the safe operating speed is 36.4 miles per hour and the critical speed is 56.2 miles per hour.

According to data furnished by the carrier, the total weight of engine 5055 was 272,200 pounds, distributed as follows: engine truck, 55,300 pounds; driving wheels, 172,300 pounds; trailing wheels, 49,100 pounds. The tender had two four-wheel trucks; its capacity was 3,500 gallons of water and 13 tons of coal. The weight of the tender was 192,000 pounds. The rigid wheel-base of the engine was 13 feet; the total length of engine and tender was 79 feet 7 inches.

Engineman McFarland entered railroad service in 1892, was employed as fireman from 1896 to 1900, as yard engineman about 3 years, and as road engineman since 1903. He was 66 years of age.

#### Observations of the Commission's Inspectors

The Commission's inspectors examined both tracks in the vicinity of the point of accident and found no indication of any equipment having been dragged or of any obstruction having been on either track prior to the accident. There was no indication that the freight train was derailed prior to the derailment of No. 53. The marks on the high rail east of the point of derailment and the marks at the point of derailment were found to be practically as described by the division engineer. There were no marks found on the low rail or between the rails.

#### Discussion

According to the evidence, No. 53 was moving at a speed variously estimated at 45 to 55 miles per hour on an  $8^{\circ}41'$  curve to the left, having a superelevation of not more than 6 inches, when the front end of the engine became derailed to the outside of the curve. The evidence was conclusive that No. 53 became derailed before the freight train.

There was no indication of dragging equipment, or of any obstruction having been on the track prior to the derailment. There was no defect in either the locomotive or the cars that would contribute to the cause of the accident.

The gage of the track on the curve involved varied from 4 feet 8-1/2 inches to 4 feet 9-1/4 inches; however, there was no indication of spread track and no indication that a wheel on the low side had dropped inside the rail at any point east of the point of derailment. Data furnished by the railroad indicated that between the easements the curvature was  $8^{\circ}41'$ ; however, according to measurements taken subsequent to the accident, the alignment on this curve was somewhat irregular, the curvature between the two easements varying between  $7^{\circ}15'$  and  $10^{\circ}22'30''$ , and there was a difference of approximately  $3^{\circ}$  in curvature in a distance of 39 feet at a point about 4 rail lengths east of the point of accident. The superelevation between the two easements varied between 5-3/4 inches and 6-1/8 inches; the maximum variation in superelevation between two adjacent stations 19-1/2 feet apart was 3/8 inch. At the point where newly made flange marks first appeared on the head of the rail above the normal position for flange wear, the curvature was  $9^{\circ}52'30''$  and the superelevation was 5-3/4 inches. Beginning at a point immediately west of the point where the

maximum curvature existed and where the superelevation was 5-7/8 inches, wavy tread marks appeared on the head of the high rail and extended a distance of 112 feet. Throughout a distance of 61 feet immediately east of the point of the derailment there were rolled flat spots on the top surface and near the outside edge of the head of the high rail. These various marks indicate that the train was moving at a speed considerably in excess of the safe speed for this curve. The maximum authorized speed on this curve was 35 miles per hour. According to the master mechanic, the safe speed was 36.4 miles per hour and the critical speed was 56.2 miles per hour. According to A.R.E.A. tables, the equilibrium, safe, and overturning speeds for an 8°41' curve having a superelevation of 5-3/4 inches are 32, 44, and 56 miles per hour, respectively; the equilibrium, safe, and overturning speeds for a 10°22'30" curve having a superelevation of 5-7/8 inches are about 22, 41, and 60 miles per hour, respectively. No member of the crew of No. 53 estimated the speed at less than 45 miles per hour and the fireman estimated it at 55 miles per hour. The engine was equipped with a speed recorder but no record of the speed at the time of derailment was available because some time prior to the accident the recorder became inoperative as a result of a broken belt. The fireman said his engine thrust laterally; this action would occur when the speed was considerably in excess of the equilibrium speed.

The fireman was in doubt that his train would round the curve safely but he saw the engineman's hand on the handle of the automatic brake-valve and thought the engineman would apply the brakes. The brakes had functioned properly en route. The engineman appeared normal on the trip; he had reduced the speed to 20 or 25 miles per hour 3 miles east of the point of accident and then he released the brakes. The throttle was closed and the drifting throttle was open but the speed increased rapidly because of the grade being 0.6 to 1.2 percent descending. Why the engineman did not reduce speed to enter the curve involved is not known, as he was killed in the accident. The fireman said that the freight train moving on the adjacent track confused him momentarily as to his location and he thought possibly the engineman was likewise confused.

#### Conclusion

This accident was caused by excessive speed on a sharp curve.

Respectfully submitted,

S. N. MILLS,

Director.