

INTERSTATE COMMERCE COMMISSION

WASHINGTON

REPORT NO. 3675

THE ATCHISON, TOPEKA AND SANTA FE
RAILWAY COMPANY

IN RE ACCIDENT

AT REDONDO JCT., LOS ANGELES, CALIF., ON

JANUARY 22, 1956

- 2 -

SUMMARY

Date: January 22, 1956

Railroad: Atchison, Topeka and Santa Fe

Location: Redondo Jct., Los Angeles, Calif.

Kind of accident: Derailment

Train involved: Passenger

Train number: 82

Consist: 2 Diesel-powered passenger units

Speed: 68-69 m. p. h.

Operation: Interlocking

Tracks: Double; 6°12' curve; 0.39 percent descending grade eastward

Weather: Clear

Time: 5:42 p. m.

Casualties: 30 killed; 122 injured

Cause: Excessive speed on curve

INTERSTATE COMMERCE COMMISSION

REPORT NO. 3675

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

THE ATCHISON, TOPEKA AND SANTA FE RAILWAY COMPANY

March 15, 1956

Accident at Redondo Jct., Los Angeles, Calif., on January 22,
1956, caused by excessive speed on a curve.

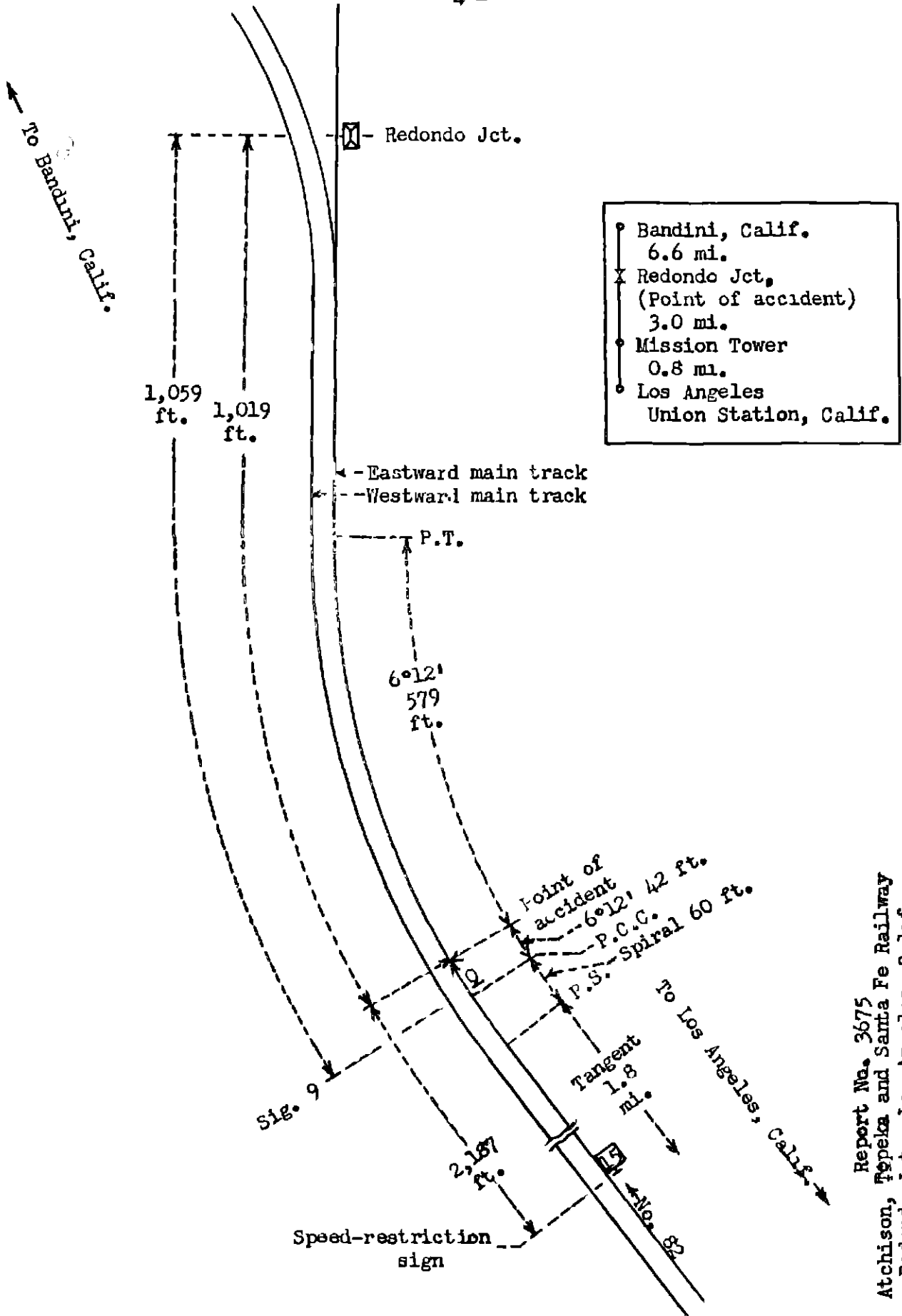
REPORT OF THE COMMISSION¹

CLARKE, Commissioner:

On January 22, 1956, there was a derailment of a passenger train on the Atchison, Topeka and Santa Fe Railway at Redondo Jct., Los Angeles, Calif., which resulted in the death of 30 passengers, and the injury of 117 passengers, 4 train-service employees, and 1 chair-car attendant. This accident was investigated in conjunction with representatives of the Public Utilities Commission of California.

1

Under authority of section 17 (2) of the Interstate Commerce Act the above-entitled proceeding was referred by the Commission to Commissioner Clarke for consideration and disposition.



Report No. 3675
 Atchison, Topeka and Santa Fe Railway
 Redondo Jct., Los Angeles, Calif.
 January 22, 1956

- 5 -

Location of Accident and Method of Operation

This accident occurred on that part of the Los Angeles Terminal Division extending between Mission Tower, Los Angeles, and Bandini, Calif., 9.6 miles. In the vicinity of the point of accident this is a double-track line, over which trains moving with the current of traffic are operated by signal indications. At Redondo Jct., 3.0 miles east of Mission Tower, interlocking limits on the eastward main track extend eastward from interlocking signal 9, located 1,059 feet west of the interlocking station. The accident occurred on the eastward main track within interlocking limits at a point 1,019 feet west of the interlocking station at Redondo Jct. From the west there are, in succession, a tangent 1.8 miles in length, a spiral 60 feet, and a compound curve to the right, having a maximum curvature of $6^{\circ}12'$, 42 feet to the point of accident and 579 feet eastward. The grade varies between 0.69 percent and 0.12 percent descending eastward throughout a considerable distance west of the point of accident, and it is 0.39 percent descending eastward at that point.

The track structure of the eastward main track consists of 112-pound rail, 39 feet in length, laid new in 1939 on an average of 25 treated ties to the rail length. It is fully tieplated with double-shoulder canted tie plates, spiked with 2 rail-holding spikes and 2 plate-holding spikes per tie plate, and is provided with 4-hole 24-inch joint bars and an average of 12 rail anchors per rail. It is ballasted with gravel to a depth of 10 inches below the bottoms of the ties. Seven gage rods per rail are provided in the curve. The superelevation at the point of derailment was 1-1/2 inches. At the most westerly point where marks of derailment were found the curvature was $6^{\circ}12'$. The distance between centers of the main tracks in the vicinity of the point of accident is 14 feet.

A rectangular speed-restriction sign 9-1/2 inches wide and 24 inches high, which bears the numerals "15" in 8-inch black figures on a background of reflectorized yellow material, is located 2,187 feet west of the point of accident. The figures are finished with non-reflectorized black paint. This sign is mounted on a post approximately 10 feet south of the center-line of the eastward main track. The top of the sign is 28-1/2 inches above the level of the tops of the rails.

- 6 -

This carrier's operating rules read in part as follows:

DEFINITIONS

Fixed Signal.--A signal of fixed location indicating a condition affecting the movement of a train or engine.

Note:--The definition of a "Fixed Signal" covers such signals as * * * slow signs or other means for displaying indications that affect the movement of a train or engine.

34. All members of engine and train crews must, when practicable, communicate to each other by its name, the indication of each signal affecting the movement of their train or engine.

890. Should the engineman fail to obey signals or become incapacitated, the fireman should stop the engine, if necessary, and report the facts to the conductor.

The maximum authorized speed for the train involved was 79 miles per hour, but it was restricted to 15 miles per hour between points 471 feet west and 2,169 feet east of the point of accident.

Description of Accident

No. 82, an east-bound first-class passenger train, consisted of Diesel-powered passenger units DC-191 and DC-192, coupled in multiple unit control. This train was being operated from the control compartment at the front of DC-191, the first unit. It departed from Los Angeles Union Passenger terminal, 3.8 miles west of the point of accident, at 5:30 p. m., on time. At Mission Tower it entered the eastward main track, and while it was moving on a 6°12' curve to the right at a speed of from 68 to 69 miles per hour both units were derailed at a point 1,019 feet west of the interlocking station at Redondo Jct.

The units remained coupled and overturned to the north. They stopped on their left sides with the front end of the first unit 550 feet east of the point of derailment. The top of this unit was 21 feet north of the center-line of the eastward main track. The front truck of the first unit was displaced and stopped on the track structure of the eastward main track 30 feet west of the front end of the unit. The rear unit stopped approximately in line with the westward main track. Both units were considerably damaged.

- 7 -

The engineer, the fireman, the conductor, and the flagman were injured.

The weather was clear and it was dark at the time of the accident, which occurred about 5:42 p. m.

The Diesel-powered passenger units involved are of stainless steel construction. Each is 85 feet long between pulling faces of the couplers and is mounted on two four-wheel trucks. The total weight of each unit is 117,060 pounds. Each is provided with a control compartment at one end and they were coupled in such manner that there was a control compartment at each end of the train. The end under-frame, the end sill, coupler carrying support, and collision posts are of fabricated steel construction. Center sills, cross bars, and floor pans are of stainless steel. The control end of each unit is reinforced in the front cover sheet and in the cab floor. The units are provided with 11 windows on each side. These windows were equipped with laminated, hermetically sealed safety glass sash 25-1/2 inches high, 55-3/4 inches long, and 1/4 inch thick, with rounded corners, and were applied from inside the unit. The seating capacity of DC-191 is 86 passengers, and DC-192 has seating capacity for 89 passengers. The center of gravity of each unit in running order, without passengers, is 52 inches above the level of the tops of the rails. The estimated center of gravity with passengers and baggage was 57 inches above the level of the tops of the rails. On a 6°12' curve with no superelevation the theoretical safe and overturning speeds for the equipment involved, as calculated by the engineering force of the carrier, are, respectively, 37 and 69.5 miles per hour. These speeds would be approximately 3 miles per hour higher on a similar curve having a superelevation of 1-1/2 inches.

DC-191, the first unit of the train, is equipped with disc brakes, HSC type brake equipment, and automatic train-stop apparatus of the intermittent inductive type. It is equipped with M23 brake valve and D-22-AR control valve. A safety-control feature actuated by a foot-pedal is provided. If pressure on this pedal is released a service application of the brakes will result, unless a brake application of predetermined pressure has been made. A hand brake is mounted in the control compartment. The unit is equipped with a push button for manual control of the sanding devices. An anti wheel-slide device is provided. This consists of inertia devices applied to a journal box of each axle and connected in such manner that an excessive rate of deceleration of any axle closes electrical contacts which actuate an electric solenoid valve in the control box to release air from the

brake cylinder and, under control of a time relay, reopen the circuit to reapply air to the brake cylinder after an interval of about 1 second. During service application of the brakes, each operation of the anti wheel-slide device will actuate the sanding apparatus for a 3-second cycle and cause sand to be deposited on the rails in front of the front wheels of the truck. Automatic sanding of the rails during an emergency application of the brakes is provided and functions for a period of 30 seconds during such applications.

Seats for the engineer and the fireman are provided on the right and left hand sides of the control compartment, respectively. A speed indicator is mounted on the front panel of the control compartment immediately in front of each seat. DC-192 is provided with identical equipment.

Discussion

As No. 82 was approaching the point where the accident occurred the enginemen were in their respective positions in the control compartment at the front of the first unit. The conductor and the flagman were in the second unit. The brakes of this train had been tested and had functioned properly when used en route. The engineer said that the equipment functioned normally when the train was departing from the terminal. The headlight was lighted brightly. The engineer said that he had a mental lapse and that he does not have a clear recollection of the events which occurred after his train passed under a street viaduct 1.46 miles west of the point of accident. He recalls that he saw a yard locomotive on the yard tracks in that vicinity, but he does not remember passing landmarks east of that point. He said that his next recollection is of the fireman standing by his side and warning him to make an emergency application of the brakes. The engineer said that he does not know whether he applied the brakes, but he felt the equipment sway alternately to the left and the right immediately before it overturned. The fireman said that all signals en route had been called and that when he called attention to the speed-restriction sign west of the curve on which the accident occurred the engineer raised his hand in acknowledgement, then reduced the throttle to No. 1 position and made a service application of the brakes. The fireman said that the speed of the train was not reduced by this brake application. He then moved to the engineer's side and warned him to apply the brakes in emergency. He said that he did not take action to stop the train because the engineer appeared to be in normal condition and responded to the warning by immediately moving the brake valve to emergency position. The derailment occurred before the speed of the train was materially reduced. The fireman estimated that the service

application of the brakes was initiated approximately 1,700 feet west of the curve and that the brakes were applied in emergency when the train was more than 1,000 feet west of the point of derailment. He said that when the equipment entered the curve it leaned toward the left and then overturned. The conductor and the flagman said that the engineer appeared to be in normal condition when they saw him prior to departure of No. 82 from the terminal at Los Angeles. The conductor said that immediately before the accident occurred he was collecting transportation from the passengers and that he was not aware that his train was closely approaching the curve on which the accident occurred. He said there were 161 passengers on the train and that all passengers were seated at the time of the accident. The flagman, who was seated at the rear of the second unit, said that he became concerned when the speed of the train was not reduced but the accident occurred before he could ascertain his exact location. Both the conductor and the flagman said that the brakes were not applied before the derailment occurred.

Examination of the track throughout a considerable distance west of the point of derailment disclosed no indication of dragging equipment nor of any obstruction having been on the track. The gage varied between 56-3/8 inches and 57 inches, and there were minor deviations in the alignment on the curve on which the accident occurred. The super-elevation at the point of derailment was 1-1/2 inches.

Two train-service employees, who were off duty, said that about 3 hours after the accident occurred they observed that the rails were sanded throughout a distance of approximately 370 feet west of the point of accident, but the master mechanic and a road foreman of engines who inspected the track in this vicinity after the accident occurred said that they saw no indications that the rails had been sanded. The master mechanic said that at two points within a distance of approximately 600 feet west of the point of derailment he saw minute quantities of white powdered material on the rails. None of these employees observed any marks on the rails which would indicate that wheels had been sliding.

The first mark of derailment was a peening of the metal on the outer edge of the top of the north, or high, rail. This mark began 102 feet east of the point of spiral of the curve and extended eastward 74 feet. Immediately east of the peening mark flange marks crossed the top of the rail and extended to the outside at a point 66 feet eastward. At this point the outer side of the head of the rail and the tops of ties on the north side of the rail were heavily

marked. Apparently wheels of the front truck of the first unit dropped outside the north rail at this point and continued off the ends of the ties at a point 15 feet eastward. Other marks on rails, track fastenings, and other parts of the track structure indicate that the wheels of other trucks dropped outside the north rail east of this point. Scraping marks were found on the top of a track motor-car set-off between the two main tracks in the area where the north rail was peened. Beginning at a point 56 feet east of the peened portion of this rail, a furrow, having a maximum depth of approximately 2 feet, was gouged in the ground 5 feet 6 inches north of the center-line of the eastward main track, apparently by the front end of the first unit. There were no flange marks on the ties or other marks of derailment between the rails. It is apparent that the equipment was moving at overturning speed and that it began to overturn immediately after it entered the curve. The derailed equipment moved tangentially until it struck the rails of the westward main track and then slid eastward a considerable distance on that track.

There were no structural defects in the equipment, and the bodies of the units were not broken open in the accident in such manner as to have contributed to the number of casualties. However, with the exception of two windows on the left side of the first unit, all windows on the left sides of both units were found to have been broken out. It is evident that the unusually large number of casualties resulting from this accident was due to persons falling or being pulled through the openings where the 25-1/2-inch by 55-3/4-inch windows had been displaced, and coming into contact with parts of the track structure while the derailed units were sliding on their sides.

Examination of the equipment of No. 82 after the accident occurred disclosed that the throttle was in No. 1 position and the automatic brake valve was in release position. The angle cock at the rear of the first unit was open, and the brake pipe was torn off the rear unit. The cutout cocks to all brake cylinders were in open position. The brake equipment of the first unit was tested at the roundhouse at Redondo Jct. on January 24, 1956. The brake equipment of the second unit was damaged to such extent that it could not be tested at this time. In testing the first unit it was necessary to plug leaks where a drain cock had been displaced from a reservoir and the air gauge which indicates brake-cylinder pressure had been broken off in the derailment. The brake system was charged from a shop air line for these tests. The automatic brake valve was tested and

- 11 -

functioned properly in all positions. The safety-control feature, and the conductor's valve at each end of the unit were tested and functioned as intended. Air passed through the brake-cylinder lines during brake applications, which indicates normal braking force would have been developed in the brake cylinders. The air hose were removed and tested and no defective condition was found. The control valves of both units were removed, and with the exception of the emergency portion of the control valve of the rear unit, which was torn off at the pipe bracket during the derailment, these valves were tested on a test rack in accordance with a standard test at San Bernardino, Calif., on January 28, 1956, in the presence of inspectors of this Commission. The control valve of the first unit met all requirements of the carrier, and the service portion of the second unit met all requirements except the graduated release test. When dismantled it was found that moisture, which apparently entered after displacement of the emergency portion of the valve, had impaired its operation in graduated release. The emergency portion of this control valve, which could not be tested because of damage, was dismantled and inspected. It was found that the check valves of this portion were seating properly and that the slide valve was free and would operate as intended.

The investigation disclosed that on the day of the accident the equipment of No. 82 arrived at Los Angeles in a west-bound train at 4:30 p. m. The engineer of the train in which the equipment arrived said that the brakes had functioned properly and that he had taken no exception to the condition of any of the control apparatus while operating the train in either direction on a round trip of approximately 256 miles. The car inspector who inspected this equipment on its arrival and prior to the departure of No. 82 took no exception to its condition. After No. 82 departed from Los Angeles the brakes functioned properly when a service application was initiated by the automatic train-stop apparatus at a test inductor in the terminal area, and it was stopped at another point in this area in compliance with a signal indication by a service application of the brakes initiated by the engineer. A running test was made after the train departed from this point and the brakes again functioned as intended. The speed was then properly controlled in compliance with a speed restriction of 10 miles per hour on a curve in the terminal area and on a curve in the eastward main track on which a speed restriction of 35 miles per hour is in effect.

- 12 -

The calculated distances in which the speed of the train involved could be reduced from 68 miles per hour to 15 miles per hour by service or emergency applications of the brakes are, respectively, 1,469 feet and 1,072 feet. Stopping distances from the same speed in service and emergency applications of the brakes are calculated, respectively, as 1,546 feet and 1,127 feet. An allowance of 10 percent plus or minus should be considered with these estimates.

Examination of the tapes of the speed-recording devices disclosed that the device of the first unit recorded the speed at the point of derailment as approximately 66 miles per hour and that of the rear unit recorded about 72 miles per hour at that point. These devices were tested and calibrated and it was found that minor variations existed between the actual, indicated, and recorded speeds. As interpreted, with correction for errors, by the mechanical and research engineer of the carrier the speed at the point of derailment was between 68 and 69 miles per hour. He said that the tapes indicate that between points approximately 1.8 miles west and 1,000 feet west of the point of accident the speed was increased from 37 to 66 miles per hour and that there was no appreciable reduction in the speed of the train before the accident occurred.

No conditions were found in any of the inspections or tests which would have caused the brakes of any of the equipment of this train to become inoperative. The brakes of the train were used immediately after departure from the terminal at Los Angeles and they functioned properly. Under these circumstances, it appears that the speed of the train would have been properly controlled approaching the point of accident if braking action had been initiated a reasonable distance in advance of the point at which the speed restriction applied.

The engineer of No. 82 was 61 years of age at the time the accident occurred. He entered the service of the carrier as a fireman in September 1918 after previous service in the same capacity, and several years later was transferred to the Los Angeles Division. He was promoted to engineer in October 1939 and qualified for passenger service in November 1942. He last received a general physical examination while hospitalized at the Santa Fe Hospital in Los Angeles from August 8 to August 20, 1955. He met the physical requirements for his position and after recovery from surgical treatment returned to service. When examined after the accident occurred the engineer was found to be in good general physical condition. It was the opinion of physicians who examined the engineer at this time that he had suffered an epileptic fugue

- 13 -

attack (a state of mental lapse) and was not conscious of his actions as the train was approaching the point where the accident occurred. Electroencephalograms which were made on two occasions during these examinations showed abnormal waves in specific areas of the brain, and were consistent with this diagnosis. This is a neurological condition which, in the absence of a history of unconscious spells, fits, or other symptoms, would not be detected in a routine physical examination.

Cause

This accident was caused by excessive speed on a curve.

Dated at Washington, D. C., this fifteenth day of March, 1956.

By the Commission, Commissioner Clarke.

(SEAL)

HAROLD D. McCOY,
Secretary.