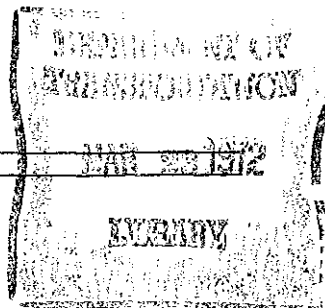


HE
1780
.A32
no.4176

RAILROAD ACCIDENT INVESTIGATION

REPORT NO. 4176



READING COMPANY

THE CENTRAL RAILROAD COMPANY OF NEW JERSEY

LANGHORNE, PA.

OCTOBER 9, 1970



FEDERAL RAILROAD ADMINISTRATION

BUREAU OF RAILROAD SAFETY

Washington, D C 20590

Summary

| | | |
|---------------------|--|--|
| DATE: | October 9, 1970 | |
| RAILROADS: | Central RR Co of New Jersey | Reading |
| LOCATION: | Langhorne, Pa | |
| ACCIDENT TYPE: | Rear-end collision | |
| TRAINS: | Freight | Freight |
| TRAIN NUMBERS: | Extra CNJ 7450 West | Extra 6920 West |
| LOCOMOTIVE NUMBERS: | Diesel-electric units C&O 7450, B&O 3727 6912, 6944 | Diesel-electric units B&O 6920, 3720, 3718, 4535 |
| CONSISTS: | 76 cars, caboose | 44 cars, 2 ca- booses |
| SPEEDS: | Standing | 36 m p h |
| OPERATION: | Signal indications | |
| TRACKS: | Multiple; 2 ⁰⁰⁰ '; 0 5% descending grade westward | |
| WEATHER: | Slightly hazy | |
| TIME: | 2:02 a m | |
| CASUALTIES: | 3 killed; 3 injured | |
| CAUSE: | Failure of engineer to operate following (RDG) train in accord- ance with a restrictive signal indication, and failure of other crew members to take appro- priate action for safe- ty of their train when the engineer neglected to do so | |

111
1780
4176

DEPARTMENT OF TRANSPORTATION
FEDERAL RAILROAD ADMINISTRATION

U.S. BUREAU OF RAILROAD SAFETY, *Bureau of*
2

RAILROAD ACCIDENT INVESTIGATION

REPORT NO 4176

READING COMPANY (RDG)

CENTRAL RAILROAD COMPANY OF NEW JERSEY (CNJ)

OCTOBER 9, 1970

Synopsis

On October 9, 1970, a rear-end collision occurred between a CNJ freight train and a RDG freight train near Langhorne, Pa. It resulted in death to three, and in injury to three, members of the train crews.

Cause

The accident was caused by failure of the engineer to operate the following (RDG) train in accordance with a restrictive signal indication, and failure of other crew members to take appropriate action for the safety of their train when the engineer neglected to do so.

Location and Method of Operation

The accident occurred on that part of the RDG extending westward from Bound Brook Jct., N. J. to Jenkintown, Pa., a distance of 47.6 miles. In the accident area, this is a three-track line over which RDG and CNJ trains are jointly operated. From the north, the main tracks are designated as No. 1, westward; No. 2, eastward, and No. 4. Trains moving with the current of traffic on tracks No. 1 and No. 2 operate by signal indications of an automatic block-signal system. Trains moving against the current of traffic on those tracks operate by train orders and a manual block-signal system. A catenary system is provided for the electric propulsion of trains.

The collision occurred on track No 1, 34 2 miles west of Bound Brook Jct and 1798 feet east of the station at Langhorne, Pennsylvania

Track

From the east on track No 1, there are, successively, a tangent 5168 feet long, a 2^o00' curve to the right 857 feet, a tangent 2405 feet, and a 2^o00' curve to the right 1072 feet to the collision point and 383 feet westward

The grade for westbound trains is, successively, 0 4% descending for a considerable distance, and 0 5% descending 1187 feet to the collision point and a short distance beyond

Time and Weather

The collision took place at 2:02 a m , under slightly hazy weather conditions

Authorized Speed

In the collision area, the maximum authorized speed for the freight trains involved is 60 m p h

Sight Distance

Because of track curvature and an embankment covered with vegetation on the north side of the railroad, a caboose standing on track No 1 at the collision point cannot be seen from an approaching westbound train on the same track at a distance greater than 610 feet

Signals

Automatic signal 96, semi-automatic signal L50 and automatic signal 88, governing westbound movements on track No 1, are 4 5, 2 9 and 1 4 miles east of the collision point, respectively They are of the color-light type and are mounted on horizontal girders supporting the wires of the catenary system Signal L50 is remotely controlled by the operator at Wayne Jct , Pa , 5 7 miles west of Jenkintown

The applicable signal aspects, and the corresponding indications and names are as follows:

| <u>Signal</u> | <u>Aspect</u> | <u>Indication</u> | <u>Name</u> |
|---------------|--------------------------|--|-----------------|
| 96 | Yellow-over-green | Proceed approaching next signal at medium speed | Approach Medium |
| L50 | Yellow-over-red-over-red | Proceed prepared to stop at next signal Train exceeding medium speed must at once reduce to that speed | Approach |

| <u>Signal</u> | <u>Aspect</u> | <u>Indication</u> | <u>Name</u> |
|---------------|-------------------|-----------------------------|-------------|
| 88 | Red with No Plate | Proceed at restricted speed | Restricting |

The circuits are so arranged that when the block of signal 88 is occupied and the blocks of signal 96 and L50 are unoccupied, and the Wayne Jct operator has cleared signal L50 for a westbound movement, signals 96, L50 and 88 display Approach-Medium, Approach and Restricting aspects, respectively, for an approaching westbound train on track No 1

Carrier's Operating Rules

Medium Speed - A speed not exceeding 35 miles per hour, unless otherwise restricted

Restricted Speed - Proceed prepared to stop short of a train, not exceeding 15 miles per hour

99

Note: When trains or engines are operating under Automatic Block Signal rules, flag protection against following trains or engines on the same track is not required

102 When a train is disabled or stopped suddenly by an emergency application of the air brakes, adjacent tracks that are liable to be obstructed must, while stopping and when stopped, be protected until it is ascertained they are safe and clear for the movement of trains

106 The conductor, engineer and pilot are responsible for the safety of the train and the observance of the rules, and, must take every precaution for protection

This does not relieve other employees of their responsibility under the rules

1481 Conductors will see that subordinates are familiar with their duties. They are responsible for the movement, safety and proper care of their trains, and for the vigilance and conduct of the men employed thereon

road freight conductors will normally ride the locomotive between points en route

Radio Equipment

The first two diesel-electric units of Extra 6920 West had radio-telephone equipment

Circumstances Prior to Accident

Extra CNJ 7450 West

This westbound CNJ freight train was manned by CNJ employees. It left Jersey City, N J at 11:00 p m the

day before the accident, and stopped on track No 2 at Elizabeth, N J, 22 2 miles east of Bound Brook Jct, to pick up cars. While the pick-up was being made, Extra 6920 West, a westbound RDG freight train, passed on track No 1. Soon afterward, Extra CNJ 7450 West proceeded on track No 2 to Bound Brook Jct, where it stopped to permit the flagman of Extra 6920 West to board the caboose. The RDG flagman had been inadvertently left by his train after it had stopped for sticking brakes on a car.

Extra CNJ 7450 West departed from Bound Brook Jct, on track No 2 and as it neared the interlocking at Belle Mead, N J, 8 3 miles westward, it passed Extra 6920 West, which had stopped on track No 1. The CNJ train passed the RDG train at reduced speed to permit the RDG flagman on the caboose to alight at the location of the caboose of his train. Soon afterward, it crossed over to track No 1 at the Belle Mead interlocking and proceeded westward ahead of the RDG train.

Extra CNJ 7450 West, consisting of 4 diesel-electric units, 76 cars and a caboose, left Belle Mead on track No 1 at 1:25 a m. The engineer, front brakeman and conductor were on the locomotive. The flagman was in the caboose. The RDG flagman was also in the caboose. He said that because of darkness and unsure footing, he remained on the CNJ caboose when it passed his train at Belle Mead.

Extra 6920 West

This RDG freight train consisted of 4 road-switcher type diesel-electric units, 44 cars and 2 cabooses. It left Jersey City at 11:25 p m the day before the accident; passed Extra CNJ 7450 West at Elizabeth, and continued westward on track No 1 to Bound Brook Jct. It stopped at the latter point for a short period, due to its flagman having seen brakes sticking on a car and having applied the train brakes from the caboose. The flagman released the sticking brakes and then signalled the engineer to proceed. He was unable to reboard the caboose when it passed his location. Thus, he was left at Bound Brook Jct, where he was picked up later by the CNJ train.

Extra 6920 West departed from Bound Brook Jct on track No 1 and proceeded to Belle Mead, where it stopped for an inspection because of actuation of a wayside hot-box detector. While stopped for this inspection, Extra CNJ 7450 West passed on track No 2, crossed over to track No 1 at the Belle Mead interlocking, and departed from Belle Mead. Seven minutes later, Extra 6920 West also left Belle Mead, and followed the CNJ train westward on track No 1. The engineer and fireman were in the control compartment at the front of the first diesel-electric unit; the conductor and front brakeman were in the control compartment of the second unit. The flagman was on the caboose of the preceding train.

The Accident

Extra CNJ 7450 West

Within 30 minutes after leaving Belle Mead, this train passed signals 96, L50 and 88 while moving on track No 1. Some time after it passed signal L50, the Wayne Jct operator initiated a control which cleared that signal for the movement of Extra 6920 West, the following train:

About 1:55 a m, an undesired emergency brake application caused Extra CNJ 7450 West to stop in the block of signal 88 with the rear end 1 4 miles west of that signal, and on a 2°00' restricted-view curve to the right. The conductor and front brakeman promptly alighted from the locomotive, and began an inspection to determine the cause of the emergency brake application. Meanwhile, the engineer placed fuses on the adjacent main tracks for protection against eastbound trains in the event the undesired brake application involved cars or lading of his train obstructing the adjacent tracks.

The conductor and front brakeman found the brake application had been caused by a separation between the 22nd and 23rd cars, due to a coupler having opened. They closed the angle cock at the rear of the 22nd car, and signalled the engineer to move the front portion of the train back to a coupling with the rear portion. At 2:02 a m, about the time that its front portion was recoupled to the rear portion, Extra CNJ 7450 West was struck from the rear by Extra 6920 West. The CNJ engineer, conductor, and front brakeman said they neither saw nor heard the following train before the collision.

Both the CNJ flagman and the RDG flagman were in the caboose of the CNJ train at the time of the collision. The CNJ flagman was killed. He had not been required to provide flag protection against Extra 6920 West, since such protection against following trains on the same track is not required by the carrier's rules in the territory involved. No trace of a burned-out fusee was found on either adjacent main track in the vicinity of the collision point, indicating the CNJ flagman had not taken any action to provide protection against trains on the adjacent tracks after the brakes of his train applied in emergency, as required by the carrier's operating rule No 102.

The RDG flagman said that he was knocked unconscious as a result of slack action caused by the emergency brake application and that he did not regain consciousness until some time after the collision.

Extra 6920 West

As this train followed Extra CNJ 7450 West from Belle Mead on track No 1, the conductor and front brakeman, the only surviving crew members on the locomotive, maintained a lookout ahead from the control compartment of the second

diesel-electric unit. According to their statements, it could be seen that the engineer and fireman were seated, respectively, on the right and left sides of the control compartment at the front of the first locomotive unit.

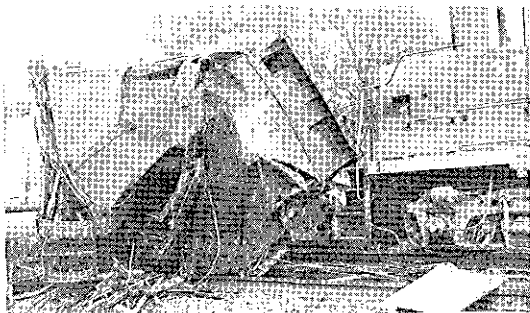
After it passed several wayside signals displaying Clear aspects, Extra 6920 West neared signal 96 while moving at a speed of 55 m p h, as indicated by the speed tape after corrected in accordance with calibrations of the speed-recording device. Both the conductor and front brakeman saw that signal 96 displayed an Approach-Medium aspect. The train moved onto an ascending grade while approaching signal 96, reduced speed as it proceeded westward in the block of that signal, and was moving at 50 m p h when the front end passed signal L50, which was seen by the conductor to be displaying an Approach aspect. The train moved onto a descending grade soon after it entered the block of signal L50 and the engineer apparently initiated a service application of the brakes on that grade, as the speed tape indicates the speed was reduced to 30 m p h by the time the train neared signal 88. Both the conductor and front brakeman said this signal displayed a Restricting aspect for their train.

The engineer apparently released the brakes while approaching signal 88, as the speed tape indicates the train had increased speed to about 32 m p h on the descending grade when it passed that signal.

After proceeding in the block of signal 88 for a distance of 3108 feet, Extra 6920 West entered a 2°00' restricted-view curve to the right while moving at a speed of 34 m p h, or 19 m p h, over the maximum speed authorized by the Restricting aspect displayed by signal 88. On the one hand, the conductor's statements indicate he had not been alarmed about the speed at which his train approached and entered that curve. On the other hand, they also indicate that because of restricted-view conditions he considered this curve to be dangerous for any train moving through it under conditions wherein an unseen train might be occupying the same track a short distance ahead. In any event, he and the front brakeman made no effort to radio the engineer and caution him to reduce speed, nor did they take any other action for the safety of their train. Extra 6920 West, however, moved through the aforesaid curve without incident and entered a 2405-foot tangent. Soon afterward, while moving on this tangent it approached another 2°00' restricted-view curve to the right, the curve on which the collision occurred. A few seconds after it entered the curve, the conductor saw a flashing marker (lamp) attached to the rear of the caboose of Extra CNJ 7450 West, apparently at a distance somewhat less than 600 feet. He called a warning to the front brakeman, who immediately applied the brakes of the train in emergency by opening the emergency brake valve in the cab of the second locomotive unit. By that time, the train had increased speed to 36 m p h, or 21 m p h in excess of the maximum speed authorized by the Restricting aspect displayed by signal 88. A few seconds later, Extra 6920 West struck the caboose of Extra CNJ 7450 West before its speed could be reduced materially by the emergency brake application.

DamagesExtra CNJ 7450 West

The caboose and last three cars of this train were derailed. The impact caused the caboose to rise from its trucks and override the underframe of the first locomotive unit of the following train. It then struck the control compartment of that unit, fell to structure of track No 2, and stopped about 50 feet west of the collision point. It was destroyed (see following photograph). The last three cars stopped in various positions on or near the structures of the main tracks. They were also destroyed or heavily damaged.



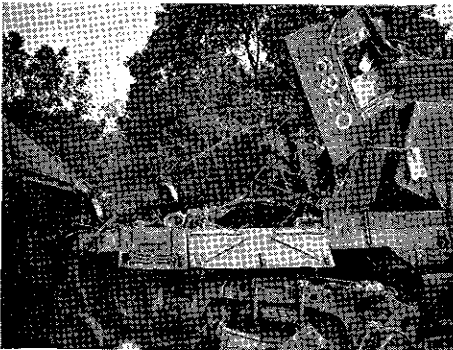
Caboose of preceding train, alongside 2nd and 3rd locomotive units of following train.

Extra 6920 West

This train stopped with the front end about 170 feet west of the collision point. The 1st and 2nd locomotive units were derailed. They stopped upright on and in line with the structure of track No 1. The control compartment at the front of the 1st unit was demolished as result of being struck by the caboose of the preceding train (see photograph on the following page). The 3rd to 7th cars, inclusive, derailed because of buckling action, and stopped in various positions on or near the track structures. The 1st locomotive unit was destroyed. The 2nd unit, the 3rd and 4th non-derailed units, all 5 derailed cars, and 1 non-derailed car were damaged moderately.

Damage Cost

The total cost of damages to the track structures, the catenary system, and equipment of both trains was \$114,700, according to the RDG's estimate.



Front, or cab, end of 1st locomotive unit
of following train.

Casualties

Extra CNJ 7450 West

The flagman was killed. The RDG flagman in the caboose of this train at the time of the collision was found seriously injured inside the caboose wreckage.

Extra 6920 West

The engineer and fireman were killed. They were found on the first locomotive unit, in debris of the destroyed control compartment. The conductor and front brakeman were lying on the floor of the control compartment of the second locomotive unit when the collision occurred. They sustained abrasions and contusions.

Train Crews' Hours of Service

Extra CNJ 7450 West

The engineer had been on duty 3 hours 52 minutes, and the other crew members 3 hours 32 minutes, at the time of the accident. All had been previously off duty over eight hours.

Extra 6920 West

All the crew members of this train had been on duty 6 hours 12 minutes at the time of the accident, after having been off duty ten hours.

Crew of Extra 6920 West

Engineer

This employee, age 56, was first employed by the RDG as a fireman in February 1942. He was promoted to engineer

in June 1946 His service record indicates he last received examinations on the carrier's operating rules and air brake equipment in November 1951 and June 1954, respectively, and last passed a physical examination in December 1969 It further indicates he was ---

- (a) Disciplined in September 1951 for moving his train between a station and a passenger train stopped at the station
- (b) Disciplined in October 1960 for failure to comply with a restrictive signal indication, resulting in an emergency brake application which caused injury to crew members in the caboose
- (c) Disciplined in October 1962 for neglecting to properly supervise another crew member in the operation of a locomotive, resulting in excessive speed and a derailment
- (d) Disciplined in July 1966 for missing a call for duty
- (e) Barred for 60 days, in 1969, from working in any capacity on a RDG train operating over a line of the Baltimore and Ohio Railroad, due to his responsibility for operating a train at excessive speed on a B&O line

Fireman

This crew member of Extra 6920 West was 38 years old He was first employed by the RDG as a fireman in June 1953, and was promoted to engineer in September 1967 He last passed a physical examination in April 1967, and was last examined on the carrier's operating rules in September 1967 His record indicates he was subjected to disciplinary action in October 1963 for failure to keep a lookout ahead, resulting in a side collision while moving on other than a main track

Conductor

The conductor, age 52, was first employed by the RDG as a brakeman in December 1945, and passed examinations for promotion to yard conductor in November 1950 His service record does not indicate the date when he was promoted to yard conductor or road conductor It indicates that he was last examined on the carrier's operating rule and air brake equipment in May 1952 and January 1957, respectively, and that he last passed a physical examination on June 1968 According to his service record, the conductor was subjected to disciplinary action in January 1949 for the derailment of a cut of cars not properly secured by hand brakes, and in December 1954 and October 1960 for derailments of cars at an improperly lined switch and an improperly lined derail, respectively On two occasions in 1960, he was commended by the RDG for detecting and reporting overheated journals on passing trains

Front Brakeman

This employee, age 49, was first employed by the RDG as a brakeman in January 1952. In December 1955, he passed examinations for promotion to conductor. He was last examined on the carrier's operating rules and air brake equipment in May 1952 and July 1954, respectively. He last passed a physical examination in January 1969. In January 1962, the front brakeman was subjected to disciplinary action for a derailment resulting from his failure to ride the leading car of a cut of cars.

Analysis

Extra CNJ 7450 West

When this train stopped on track No. 1 in the block of signal 88 because of the undesired emergency brake application, crew members were required to protect the adjacent main tracks until it was ascertained those tracks were safe and clear for the movement of trains. The flagman was not obligated to provide protection against following trains on track No. 1, because the carrier's operating rules do not require such protection in the signal territory involved. The investigation revealed that after his train stopped because of the emergency brake application, the flagman apparently did not leave the caboose to protect the adjacent main tracks as required. The reason why he apparently remained in the caboose could not be determined. Since the RDG flagman, who was accompanying the CNJ flagman, stated that he was knocked unconscious as a result of the emergency brake application, there is a possibility the flagman of Extra CNJ 7450 West remained in his caboose due to incapacitation resulting from rough slack action caused by the emergency brake application.

It is unfortunate that the CNJ flagman did not or could not leave his caboose, because he probably would have escaped fatal injury had he been protecting the adjacent main tracks as required. It is also unfortunate that he was not providing such protection, because of the possibility that he would have displayed stop signals when Extra 6920 West was seen to be approaching his train from the rear on track No. 1 and that those signals could have forewarned the engineer of the approaching train in sufficient time to stop short of a collision.

Extra 6920 West

Due to the CNJ train being stopped in the block of signal 88, signals 96, L50 and 88 displayed Approach-Medium, Approach, and Restricting aspects, respectively, for Extra 6920 West, the RDG train. Under those circumstances, Extra 6920 West was authorized to (a) proceed in the block of signal 96 and approach signal L50 at a speed not exceeding 35 m p h, (b) proceed in the block of signal L50 at a speed not exceeding 35 m p h, and (c) to proceed in the block of signal 88 at not more than 15 m p h, prepared to stop short of a train ahead. The investigation revealed that Extra 6920 West was moving at excessive speed in the block of signal 96 when it approached signal L50, and that the train moved at

excessive speed in the block of signal L50 until the engineer initiated a brake application which reduced the speed to 30 m p h in approach to signal 88. He then released the brakes, with the result that the train began to increase speed on the descending grade and passed signal 88 while moving at 32 m p h. Soon afterward, it entered the restricted-view curve on which the collision occurred while moving at 36 m p h, or 21 m p h faster than the maximum speed authorized by the Restricting aspect of signal 88.

As a result of the conductor seeing the flashing marker at the rear of Extra CNJ 7450 West, after it came into view at a distance of 610 feet, the front brakeman opened the emergency brake valve in the cab of the second locomotive unit, applying the train brakes in emergency. Since the automatic brake valve of the first locomotive unit was found in emergency position after the accident, it appears the engineer may have moved that brake valve to emergency position about the same time the front brakeman opened the emergency brake valve of the second unit. In any event, it is evident that because of its excessive speed and proximity to the preceding train when the brakes were applied in emergency, there was insufficient braking distance for Extra 6920 West to stop short of a collision or reduce speed materially before the collision occurred. As a result, the train collided with the caboose of Extra CNJ 7450 West while moving at 36 m p h.

It is obvious that the primary cause of the accident was failure of the engineer to operate Extra 6920 West in accordance with the Restricting aspect displayed by signal 88 and with restricted-view conditions in the vicinity of curves within the block of that signal. The reason for his failure to comply with the Restricting aspect of signal 88 could not be determined. However, in view of the entries in his service record related to handling of trains, and the speed at which he operated his train in approach to signal L50 and within the block of that signal, as well as within the block of signal 88, the indications are that it might have been his practice to operate trains at excessive speed and that such practice finally led to the collision with Extra CNJ 7450 West.

It is further obvious that a significant causal factor in the accident was failure of the fireman, conductor and front brakeman of Extra 6920 West to take appropriate action for the safety of their train when the engineer neglected to control the speed properly in the block of signal 88. The investigation disclosed that the conductor, and perhaps the front brakeman also, was apparently quite concerned for the safety of his train in the block of signal 88 due to its speed and the restricted-view conditions at or near curves within the block of that signal. Nevertheless, he took no action to utilize readily available radio equipment and caution or instruct the engineer to reduce speed compatible with signal and sight conditions. Had he taken such action, the accident might have been averted. In connection with the performance of the crew of Extra 6920 West, one cannot overlook the service records which indicate that the engineer,

conductor, and front brakeman had not been examined or instructed on the RDG operating rules and brake equipment for a 16- to 19-year period. Their apparent lack of training over a lengthy period of time could have contributed to the accident if it led to the aforesaid crew members being unremindful of the application of the carrier's operating rules or lax in their compliance with such rules, as indicated by the movement of their train in approach to the collision point.

Findings

1 Extra CNJ 7450 West was standing on track No. 1 within the block of signal 88 in compliance with applicable rules and regulations so far as they pertain to following movements on the same track.

2 Due to Extra CNJ 7450 West occupying its block, signal 88 displayed a Restricting aspect. This aspect authorized Extra 6920 West to proceed in the block of signal 88 at a speed not exceeding 15 m p h, prepared to stop short of a train ahead.

3 Extra 6920 West passed signal 88 while moving at excessive speed, and continued in the block of that signal at increasingly excessive speed even though conditions at curves materially restricted the view of the crew members on the locomotive.

4 No other crew member took appropriate action for the safety of his train when the engineer neglected to properly control the speed of Extra 6920 West in the block of signal 88.

5 Extra 6920 West was moving on a restricted-view curve at 36 m p h, or 21 m p h in excess of the maximum speed authorized by the Restricting aspect of signal 88, when the preceding train came into view a short distance ahead and the front brakeman applied the brakes in emergency.

6 Because of its excessive speed and proximity to the train ahead, there was insufficient braking distance for Extra 6920 West to reduce speed materially before it collided with the rear-end of Extra CNJ 7450 West.

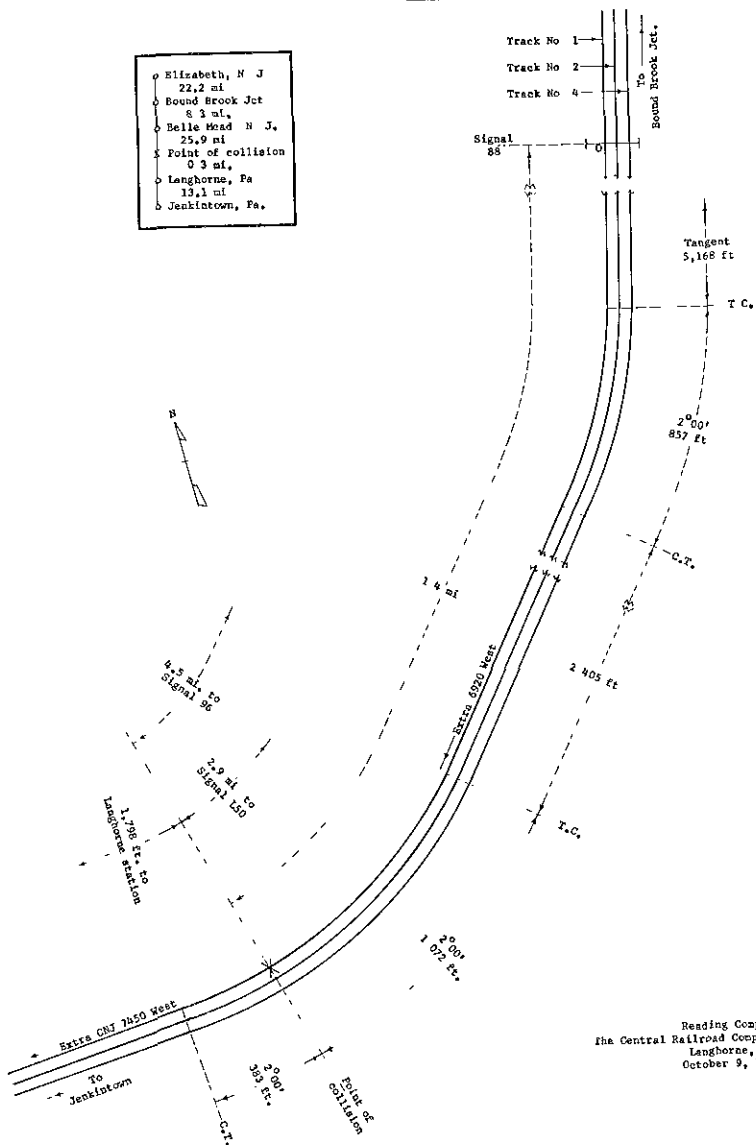
7 The accident was caused by failure of the engineer to operate Extra 6920 West in accordance with a restrictive signal indication, and failure of other crew members to take appropriate action for the safety of their train when the engineer neglected to do so.

8 Records indicate the RDG had not provided crew members with refresher training or instructions related to air brakes and operating rules over an extensive period of time.

Dated at Washington, D C , this 20th
day of December 1971
By the Federal Railroad Administration

Mac E Rogers, Director
Bureau of Railroad Safety

- Elizabeth, N J
22.2 mi
- Bound Brook Jct
8.3 mi.
- Belle Mead N J,
25.9 mi
- ✕ Point of collision
0.3 mi.
- Langhorne, Pa
13.1 mi
- Jenkintown, Pa.



Reading Company
The Central Railroad Company of New Jersey
Langhorne, Pa.
October 9, 1970